ABSTRACT

Premature menopause is a pathological condition characterized by the cessation of the functional activity of the ovaries in women under the age of 40 and manifested by amenorrhea, high levels of gonadotropins in the blood, infertility and symptoms of estrogen deficiency. POF occurs on average in 1% of women. The exact nature of the disease remains unknown. The basis of this pathology, regardless of the etiological factor, is a decrease in the reserve of primordial follicles, which is unusual for this age period, up to its complete depletion and the formation of the afollicular type of POF. This condition is described as a "multifactorial syndrome" due to chromosomal abnormalities, genetic disorders, fermentopathies, infectious and iatrogenic factors.

KEYWORDS

Premature menopause, echography, amenorrhea, primordial follicle, infertility, hormone replacement therapy.

INTRODUCTION

Premature ovarian failure is a complex, multifactorial and long-term process. The term "premature ovarian failure" (POF) denotes a complex of symptoms that develops in women...
under 40 years of age and includes amenorrhea, signs of pronounced estrogen deficiency and infertility with elevated levels of gonadotropins (FSH, LH) [1, 2]. The literature discusses the age range that makes it legitimate to diagnose premature ovarian failure. The age of POF formation is considered to be 35-43 years [8, 13], but most researchers point to the age of up to 40 years [6].

This pathology, regardless of the etiological factor, is based on a decrease in the supply of primordial follicles, which is unusual for this age period, up to its complete depletion and the formation of the afollicular type of POF. This condition is described as a "multifactorial syndrome" caused by chromosomal abnormalities, genetic disorders, fermentopathies, infectious and iatrogenic factors [1, 4,8].

There is a directly proportional relationship between the pool of primordial and the number of growing follicles, therefore, with a decrease in the number of the first, the size of the cohort of follicles, taken monthly in the ovulatory cycle, decreases. It is impossible to objectively assess the ovarian pool in vivo, therefore, indirect methods of determining it are necessary. According to some authors [2,4], along with hormonal methods, the main method is echography, which includes determining the volume of the ovary and the number of antral follicles. It has been established that the volume of the ovary is less than 3 cm³ [2, 9] and the presence of less than 5 antral follicles in the ovary is an unfavorable prognostic sign of the ovarian reserve [2, 4]. The number of antral follicles detected by transvaginal echography reflects the remaining pool of "resting" primordial follicles, which is confirmed by a number of works based on histological studies, in which a direct relationship was proved between the number of primordial and growing follicles [11,13].

At present, hormone replacement therapy is prescribed to correct early, mid-term and late metabolic disorders typical of POF [1]. At the same time, drugs are used, which include natural estrogens in dosages that temporarily maintain their concentration in blood plasma at the level of the early follicular phase of the menstrual cycle.

The aim of this study is to assess changes in the echographic parameters of the pelvic organs in patients with POF using sonography.

MATERIALS AND METHODS

We examined 35 women with premature ovarian failure aged 18 to 40 years (mean age 36.4 ± 2.8) before and after 12 months of taking hormone replacement therapy. The control group included 30 women of reproductive age with a preserved menstrual rhythm, who underwent echography of the pelvic organs on the 3rd day of the cycle. The levels of hormones (FSH, LH, E₂ and T) were determined by ELISA using the appropriate test systems. Transvaginal ultrasound examination of the pelvic organs was carried out on the "" apparatus using a multi-frequency transvaginal transducer with a frequency of 8 - 6 - 4 MHz. With transvaginal echography of the pelvic organs, the volume of the ovaries was calculated and the antral follicles in them were counted, in addition, the size of the body of the uterus was measured and the state of the endometrium was studied.

Hormone replacement therapy for patients with premature ovarian failure was carried out with «Lenzetto» preparations (spray,
transdermal, 1.53 ml / 1 dose, (Gedeon Richter, Hungary). The estrogenic component in it is represented by estradiol hemihydrate. «Lenzetto» was used 1 time per day in a continuous sequential mode in combination with Duphaston (10 mg) Duphaston was prescribed for 14 days.

Statistical data processing was performed on a computer using «Microsoft Excel» spreadsheets and «Statistica for Windows» v. 7.0, StatSoft Inc. (USA).

RESULTS

A prospective clinical and laboratory examination of 35 patients with POF (mean age 36.4 ± 2.8 years) was carried out. By the time of the study, the duration of the disease was 4.7 ± 1.4 years, and the age of onset of the disease was 30.2 ± 2.6 years. The onset of menstrual rhythm disturbances occurred at the age of 29.3 ± 1.3 years.

Among the reasons that led to the development of POF, the patients most often noted stress factors (26.92%), although in the majority of patients (53.85%) it was not possible to establish the direct cause of POF.

The onset of the disease by the type of oligoamenorrhea was detected in the majority of patients (92.3%), only 7.7% had a sudden cessation of menstruation as a persistent amenorrhea.

All patients with POF complained of secondary amenorrhea, 25 (71.4%) - increased fatigue, 23 (65.7%) - hot flashes, 21 (60%) - infertility, 16 (45.7%) - for decreased libido, 7 (20%) - for vaginal dryness, 5 (14.3%) - for dizziness, 3 (8.6%) - for frequent urination, 2 (5.71%) - for weight gain, 2 (5.71%) - for an increase in blood pressure.

The severity of symptoms of sex hormone deficiency according to the Kupperman index (16.1 ± 1.6 points) was assessed as moderately severe.

The average level of LH and FSH in patients with POF significantly exceeded the standard values for women of reproductive age, amounting to 92.6 ± 4.8 and 117.8 ± 4.2 IU / L, respectively. The concentration of estradiol (75.4 ± 9.6 pmol / L) in women with POF was significantly lower than the normative indicators of the early follicular phase in women with regular menstruation, while in 24 (68.6%) patients the level of estradiol did not exceed 69 pmol / L and averaged 54.6 ± 12.7 pmol / L. It is interesting to note that, on average in the group, in women with POF, the testosterone level was 1.1 ± 0.07 nmol / L, and in 21 (60%) patients it was within 0.3-0.8 nmol / L and amounted to 0.71 ± 0.2 nmol / L, which is regarded as a persistent hypoandrogenic state.

To study the size and internal structure of the ovaries, 35 women with POF underwent transvaginal echography of the pelvic organs (Table 1) (Fig. 1).
Table 1. Echographic characteristics of the ovaries in patients with premature ovarian failure

| Indicator                                      | Patients with PYAN (n = 35) |
|------------------------------------------------|----------------------------|
| Ovarian imaging on both sides                  | 27 (77,14%)                |
| Ovarian imaging on the right only              | 2 (5,7%)                   |
| Ovarian imaging on the left only               | 2 (5,7%)                   |
| The ovaries are not visualized on both sides   | 1 (2,9%)                   |

Table 2. Echographic picture of the ovaries in patients with premature ovarian failure and control group

| Indicator                                      | Patients with POF (n = 35) | Control group (n = 33) |
|------------------------------------------------|---------------------------|------------------------|
| Right ovary volume, cm³                        | 1,78 ±0,21*               | 5,9 ±1,6               |
| Left ovary volume, cm³                         | 1,79 ±0,26*               | 6,0 ±1,4               |
| Follicular type of POF                         | 17 (51,5%)*               | 33 (100%)              |
| Up to 5 antral follicles                      | 9 (25,7%)                 | -                      |
| 5-10 antral follicles                         | 8 (22,9%)*                | 33 (100%)              |
| Average number of antral follicles for per ovary | 3,4 ±1,2*                | 6,6 ±1,7               |
| Afollicular type POF                           | 15 (42,9%)                | -                      |
| Uterine body volume, cm³                       | 27,4 ±2,3*                | 46,7 ±1,9              |
| M-echo, cm                                     | 0,3 ±0,08                 | 0,5 ±0,02              |

Note. * - Significant difference in relation to the control group (P <0.05).
Table 3. Hormonal profile of patients with follicular and afollicular types of premature ovarian failure.

| Indicator          | Follicular type of POF (n=15) | Afollicular type of POF (n=20) |
|--------------------|-------------------------------|-------------------------------|
| E2 level, pmol / l | 105.6+18.41*                  | 61.2+5.6                      |
| FSH level, IU / L  | 100+12.8                      | 111+10.8                      |

Hormone replacement therapy was recommended to all 35 patients with POF to relieve early (and in some cases, late) symptoms of sex hormone deficiency. During the administration of the drug, all patients experienced a regular menstrual-like response, no acyclic spotting was observed.

After 12 months of taking hormone replacement therapy, the Kupperman index was determined in patients. It was 5.6 ± 1.6 points, which indicates the replacement of the missing sex hormones. This has also been confirmed by hormonal studies (Table 4).

Table 4. Hormonal profile in patients with premature ovarian failure before and after 12 months of taking HRT.

| Indicator | Average value                      |
|-----------|-----------------------------------|
|           | Before treatment | After treatment |
| FSH, IU / L | 117+37.6         | 49.2+9.64       |
| LH, IU / L  | 92.4+34.7        | 50.2+8.1        |
| E2, pmol / l | 77.1+9.6        | 178.4+30.1      |
| T, nmol / L  | 0,9+0,18         | 1,2+0,2         |

As can be seen from Table 4, after 12 months of taking HRT, the LH level decreased almost 2 times and amounted to 50.2 + 8.1 IU / L, FSH - more than 2 times (49.2 + 9.64 IU / L)...

Simultaneously with the fall in the level of gonadotropins, the level of E2 increased by 2.3 times (178.4 + 30.1 pmol / l). During therapy, we also achieved an increase in testosterone levels...
by about 20% (from 0.9 + 0.18 to 1.2 + 0.2 nmol / l).

After hormone replacement therapy, 28 patients with POF underwent dynamic transvaginal echography of the pelvic organs. At the same time, an increase in the volume of the ovaries was revealed by 32-80%, the body of the uterus - by 35%, as well as a relative improvement in the indices of the ovarian reserve (Table 5).

| Indicator                          | Before treatment | After treatment |
|------------------------------------|------------------|-----------------|
| Right ovary volume, cm³            | 1,78 ± 0.21*     | 2.4 ± 0.6       |
| Left ovary volume, cm³             | 1.79 ± 0.26*     | 3.2 ± 0.8       |
| Follicular type of POF             | 17 (51.5%)*      | 19 (67.9%)      |
| Up to 5 antral follicles           | 9 (27.3%)        | 22 (78.6%)      |
| 5-10 antral follicles              | 8 (24.2%)*       | 4 (14.3%)       |
| Average number of antral follicles | 3.4 ± 1.2*       | 5.0 ± 1.0       |
| per ovary                          |                  |                 |
| A follicular type of POF           | 15 (45.5%)       | 9 (32.1%)       |
| Uterine body volume, cm³           | 27.4 ± 2.3*      | 35.1 ± 2.6      |
| M-echo, cm                         | 0.3 ± 0.08       | 0.5 ± 0.09      |

Note. * - p < 0.05 when compared between the two groups.

**DISCUSSION**

The results of the study show a decrease in the volume of ovarian reserve in women with POF (up to 1.78 + 0.21 and 1.79 + 0.26 cm³ for the right and left ovaries, respectively) and the number of antral follicles (up to 3.2 ± 0.9 follicles on the ovary). They agree with the data obtained earlier [1]. Ignatieva R. Ye. Et al. [5] found that in POF the follicular type of pathology is detected in 60% of cases. We found follicles in 64.5% of women with POF, which indicates a significant decrease in ovarian reserve in the examined patients.

In patients with POF against the background of hormone replacement therapy with drugs that include a gestagen with a partial androgenic effect, an increase in ovarian volume was noted by 31-77%. The average volume of the uterus during therapy increased by 34%. The data obtained are due to an increase in the level of E2 (77.1 + 9.6 to 178.4 + 30.1 pmol / L) and a decrease in FSH (from 117 + 37.6 to 49.2 + 9.64 IU / L). Our data are consistent with the results of the XuH study. etal. [13].
Thus, the follicular type of POF was detected in 67.9% of patients compared to 55.5% before treatment, while in 22 (78.6%) patients up to 5 antral follicles were visualized, in 4 (14.3%) patients - up to 10 antral follicles, which indicates a relative improvement in ovarian reserve indicators.

CONCLUSION

Thus, transvaginal echography is a non-invasive highly informative technique that allows dynamic monitoring of patients with POF who are taking hormone replacement therapy. To increase the effectiveness of hormone therapy, patients with POF should be advised to modify their lifestyle taking into account the existing corrected cardiovascular risk factors.

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