

## THE ULTRASOUND SCAN ASPECT CORRELATED WITH THE POLYCYSTIC OVARY SYNDROME

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Received: 25 September 2015 / Revised: 28 September 2015 / Accepted: 06 October 2015

Published: 25 November 2015

**Keywords:** PCOS- Polycystic Ovary Syndrome, echography, infertility

**Abstract.** The Polycystic Ovary Syndrome is one of the most frequent endocrine diseases when talking about women who reached the reproduction age, having an estimated incidence of 5 - 40% and it represents 75% of the cases of anovulatory infertility. This personal study represents a retrospective analysis of a total number of 321 patients diagnosed with polycystic ovary syndrome (PCOS) in the period of time between 2010 and 2014 from the clinical, paraclinical and statistical point of view. The patients were systematically assessed in time and underwent a medical therapeutic method in the Clinic of Obstetrics-Gynaecology of the Emergency County Hospital Bacău. The patients included in the study were followed during their hospitalization, but also after that, in order to study the evolution of the case. They were performed transabdominal and transvaginal ultrasonography scans, as they are extremely important in the algorithm of paraclinical diagnostic. Based on the data we collected we can now state that in 69% of the cases the ultrasound scan was the predominant criterion for diagnosing polycystic ovaries. For the rest of the cases, including the ones with a normal ultrasound scan of the ovaries, the diagnostic was established after correlating the clinical data with the other paraclinical ones, as agreed in the Rotterdam consensus. About 7-8% of the women having a reproductive age are affected by the polycystic ovary syndrome, so this is considered to be the main cause of infertility in women, and also the most frequently met endocrine disease in women.

### INTRODUCTION

The polycystic ovary syndrome (PCOS) is a current issue worldwide and also in our country and represents a health problem of the modern world, permanently raising important therapeutical issues for the gynaecologist and endocrinologist.

There have been many special researches in the most important endocrinology and gynaecology scientific centres in the world that were published and presented in many congresses, symposiums, conferences that show the importance of polycystic ovary syndrome problem. It has many medical and social aspects and that is why it represents the world leader of hormonal disorders (Amato and Simpson, 2004; Shayya and Chang, 2010).

Because of its frequency, this syndrome has aroused a wide interest in the international scientific circles, the high number of publications in medical journals being a strong proof.

The polycystic ovary syndrome is a complex, heterogeneous entity, with multifactorial aetiology, with an incompletely elucidated physiopathology and without defining features from the pathological point of view. The hormonal disorders that characterize this syndrome have a strong negative psychological effect, affecting the patients' quality of life.

PCOS is one of the most frequent causes of hormonal imbalance in women along their reproductive life and also one of the first causes of infertility (Duleba, 2012).

### PURPOSE AND OBJECTIVES

The clinical, paraclinical and statistical retrospective analysis of a group of patients who were diagnosed with polycystic ovary syndrome (PCOS), in the period of time between 2010 and 2014, were systematically assessed in time and followed a medical therapeutic method in the Clinic of Obstetrics-Gynaecology of the County Emergency Hospital Bacău, with the purpose of obtaining the level of correlation between the ultrasound scan and PCOS presence.

### MATERIAL AND METHODS

In the period of time between 2010 and 2014 a number of 321 patients were recorded, diagnosed with polycystic ovary syndrome (PCOS), using ultrasound scanning and hormone tests.

The ovary ultrasound scan is an essential examination when diagnosing PCOS. You can perform this examination trans-abdominally or you can use a transvaginal probe, the latter having a much higher accuracy. Built on the powerful Expert Series platform, the Voluson E6 combines advanced 2D and 3D probe technology plus innovative hardware and software architecture. Every component works together—processing multiple data points simultaneously in real-time to help deliver exceptional images.

The ultrasound scan contributes substantially to establishing the diagnostic of PCOS, operating data about the dimension of the ovaries, of the areas with morphological changes, the differentiation between the cystic areas and the solid areas existing on the surface of the ovary, between the distribution and the number of these cysts. High-frequency sound waves are transmitted from the probe through the gel into the body. The transducer collects the sounds that bounce back and a computer then uses those sound waves to create an image. Ultrasound examinations do not use ionizing radiation (as used in x-rays), thus there is no radiation exposure to the patient. Because ultrasound images are captured in real-time, they can show the structure and movement of the body's internal organs, as well as blood flowing through blood vessels.

All patients have agreement on the use of data and photos for publication.

#### **Ultrasonographic criteria**

The ultrasonographic criteria used to diagnose PCOS are: the presence of 12 or more follicles in each ovary, with a diameter of 2-9 mm and/or an increased volume of the ovary over 10 ml. The distribution of the follicles can be omitted, but an increased stromal echogenicity is important. This definition does not apply to the women who took oral contraceptives, because they change the ovary morphology. It only takes one ovary to fulfil this criteria in order for somebody to be diagnosed with PCOS (The Rotterdam ESHRE/ASRM, 2004).

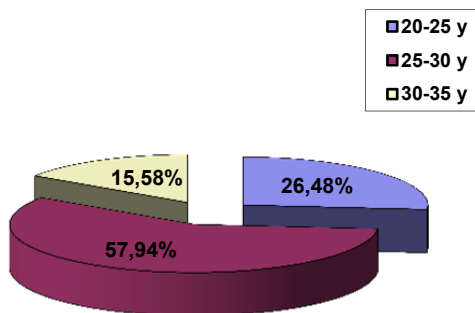
The ultrasound scan shows that the polycystic ovaries are present in 16-25% of the women who are apparently normal, with regulated menstrual cycles (Adams et al., 2004).

The ultrasonographic examination is essential for the diagnostic, having an important concordance with laparoscopy and histologic examination.

Lately, the transabdominal and/or transvaginal ultrasound scan has become the most frequently used diagnostic method for identifying polycystic ovaries. Although there has never been a universal opinion regarding the ultrasonographic criteria for diagnosing polycystic ovaries, the accepted characteristic features are: an increased size (volume) of the ovary caused by the great number of follicles and the stromal volume when compared with normal ovaries.

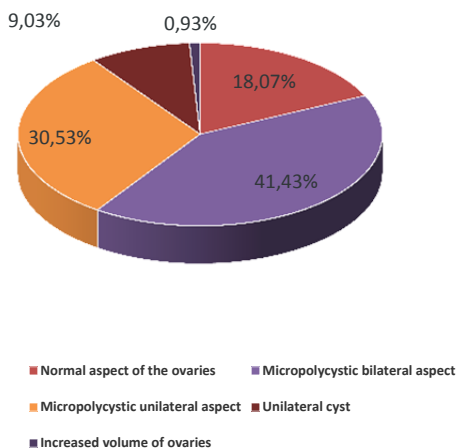
## **RESULTS AND DISCUSSION**

The age of the patients varied from 20 to 35 years old, the mean age of the group being  $29.77 \pm 4.12$  years old. The age was homogenous for all the groups studied ( $p=0.027$ ), with a slightly reduced mean value for the patients with primary infertility (28.93 years old vs. 30.75 years old), especially the ones with thyroid pathology in their medical history. Based on the cases studied we noticed an increased frequency for the patients belonging to the age group 25-30 years old (57.94%).



**Fig. 1.** *The distribution of the lot on age groups*

We obtained the following ultrasound results for the studied group:



**Fig. 2.** *The percentage of the ultrasound aspects for the patients included in the study.*

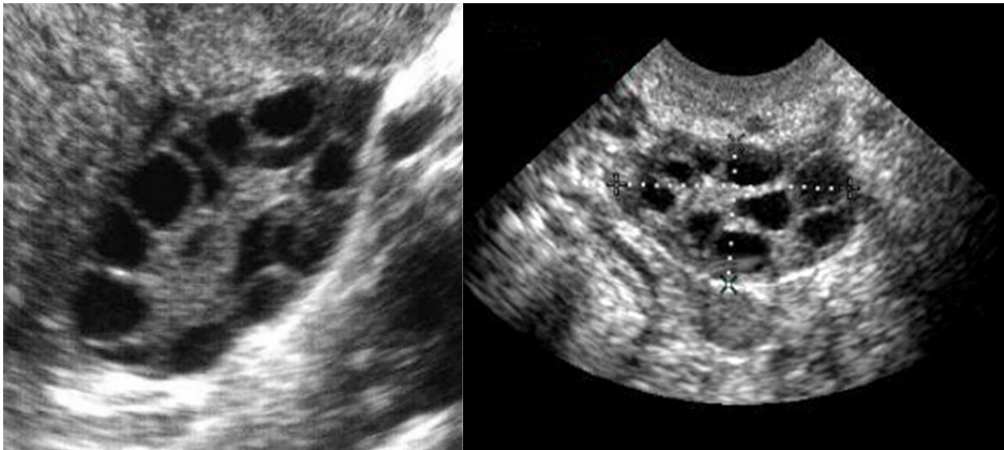
For most patients included in our study the ovary ultrasound scan was performed transabdominal.

**TABLE I** – Ultrasound exam for the group studied

Results	No. of cases	Percentage
Normal aspect of the ovaries	58	18.07%
Bilateral micropolycystic aspect	133	41.43%
Unilateral micropolycystic aspect	98	30.54%
Unilateral cyst	29	9.03%
Increased volume of the ovaries	3	0.93%



**Fig. 3. Transvaginal ultrasound aspect of polycystic ovaries  
(R.G. personal collection)**



**Fig. 4. PCOS (R.G. personal collection)**

Based on the study made we noticed that obesity is predominant for the women in their thirties, especially for the ones who already gave birth to one child, and it increases with parity.

A great part of the women diagnosed with PCOS are overweight or obese, often showing resistance to insulin and an increased body mass index, and these factors indicate an increased frequency of the metabolic syndrome for the women with PCOS.

The frequency of the metabolic syndrome, highlighted through a cohort study conducted by Talbott and collaborators, was 15% for the women with PCOS and a mean BMI of  $25.8 \text{ Kg/m}^2$ , and only 3.5% in the case of the control group with a mean BMI of  $24.5 \text{ Kg/m}^2$ . Furthermore, it

is worth noticing that one in every three women with PCOS met at least two criteria of ATP III diagnosis, while in the group of healthy women these criteria were met by 1 in 12 people (Talbot et al., 2004).

Obesity and not the pattern of the menstrual cycle or the number of follicles that are detected by ultrasound scan causes hyperinsulinemia, dyslipidaemia and high blood pressure for the women with PCOS that get older (Elting et al., 2001).

PCOS represents the result of a "vicious circle", which can be initiated on many levels. Functional impairment at any level has the same results: excess of anovulation and ovarian androgens.

When explaining the syndrome physiopathology we notice a few theories: a single injury in action and insulin secretion that leads to hyperinsulinemia and insulin-resistance; primary neuroendocrine defect, which leads to an exaggerated frequency and amplitude of the pulse by LH; a defect when it comes to synthesizing androgens and this results in an increased production of androgens in the ovaries; impaired cortisol metabolism resulting in an increased adrenal androgen production.

Still the data in specialized literature differ many times, because of interracial and interethnic variability, but also depending on the criteria used for diagnosing the syndrome. The Rotterdam agreement introduced for the first time ovarian examination with the help of the ultrasound scan as a method of diagnosing PCOS. Although transvaginal ultrasound scan shows the ovary morphology in the most precise way, you can also use transabdominal ultrasound scan, as an alternative for examining teenagers and women who haven't started their sex life yet.

In the late 80s, the researchers described the classic ultrasound signs of PCOS. They thought there was the possibility for most cases to be diagnosed by ultrasound scan, until they discovered that 20% of the "normal" women showed ultrasound images that were similar to those with polycystic ovaries. So it was demonstrated that those women had an increased risk of spontaneous abortion (Dalton, 2000).

The ultrasound characteristics of the syndrome are: many ovary follicles of small dimensions, between 2 and 9 mm, placed at the periphery of a thickened stroma.

A specific PCOS feature is the fact that follicular maturation stopped and also small ovarian cystic follicles accumulated under the cortex and increased the volume of the ovary. This change was shown through ultrasound scanning and imposed the name of polycystic ovary.

Women with PCOS have irregular and anovulatory menstrual cycles, which explain infertility. However, researchers like Elting et al. (2000, 2001), after multiple studies performed on women diagnosed with PCOS, reached the conclusion that these menstrual cycles become regular once the women grow older. This fact was believed to be caused by a diminished size of the follicle cohort thanks to ovary aging. Thus, we can assume that, once the menstrual cycles are regular again, fertility will improve, too.

PCOS is a heterogenic collection of signs and symptoms that form together the spectrum of this disease, with strong involvement and severe imbalances in reproduction, endocrine and metabolic status.

PCOS is one of the most frequent causes of hormonal imbalance for women all through their reproductive life and one of the first causes of infertility.

We have not agreed on the way in which we can diagnose the polycystic ovary syndrome (PCOS) in adolescence. The premature labelling of PCOS diagnostic for a teenager can be incorrect and can lead to useless treatment, worsening the psychological stress, that were associated in adolescence with disorders and therapies involving the body image and

reproduction problems (Carmina et al., 2010). Because of these problems, some researchers even suggested to avoid diagnosing this disease until the patient is 18, while others proposed very strict and specific diagnostic criteria (Shayya and Chang, 2010). However, if girls are affected by this syndrome, it can be useful to start a treatment while they are still teenagers (Sultan and Paris, 2006).

Ovarian ultrasound is an essential examination for diagnosing the studied disease. It can be performed trans-abdominally or use an endovaginal probe, the latter having higher accuracy. It also contributes substantially to establishing the PCOS diagnosis, operating with data about the ovary size, the areas with morphological changes, the differentiation between the cystic areas and the solid areas that are present on the ovary surface, the distribution and number of these cysts.

You must also consider the fact that about 10-30% of the women with PCOS do not show polycystic ovaries during the ultrasound scan (Balen et al., 2003).

## CONCLUSIONS

The polycystic ovary syndrome is considered to be one of the most frequent conditions of the women at their reproductive age. As it is a chronic state of hyperandrogenic anovulation, PCOS shows important clinical consequences for the patients, which include hirsutism, anomalies of the menstrual cycle, infertility, diabetes, cardiovascular diseases and endometrial cancer.

The polycystic ovary syndrome is a complex condition, with a heterogenic aetiology and it is not fully known. It is defined through a wide range of clinical, hormonal and anatomical elements that vary as intensity and are differently associated.

About 7-8% of the women in their reproductive age are affected by polycystic ovary syndrome, so this is considered to be the main cause of infertility in women, and also the endocrine condition most frequently met in women.

Based on the cases studied we noticed an increased frequency of the patients in the age group 25-30 years old (57.94%).

Some of the patients with PCOS who succeeded to lose weight got a spontaneous pregnancy (50%) but only a part of them got to term, as the others had spontaneous abortion (19%).

Hormone and ultrasound monitoring is compulsory during therapy in order to be able to control the appearance of ovarian hyperstimulation syndrome.

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