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DISCUSSION OF POLYCYSTIC OVARY SYNDROME AND THE EMBLEMATIC OF CLINICAL, LABORATORY AND IMAGING DIAGNOSIS

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ABSTRACT

The objective of this study was to describe the main parameters related to the diagnosis of Polycystic Ovary Syndrome (POS). An integrative review was carried out with a search in the PUBMED, MEDLINE and virtual health library (VHL) databases, using the descriptors *"polycystic ovary syndrome"*, "diagnosis"AND*"clinical aspects"* AND*"markers"* AND *"diagnostic imaging"*. The inclusion criteria of the research: articles in English, Portuguese and Spanish available complete and online, published between 2016 and 2020, being excluded articles that did not address diagnostic methods of POS. Throughout the diagnostic investigation of POS, it was observed that the main clinical parameters are those that point to hyperandrogenism (hirsutism, acne, alopecia), in addition to the presence of menstrual dysfunction, such as amenorrhea, resulting from anovulation. Among the laboratory aspects, the elevation of biochemical markers, such as free testosterone and dehydroepiandrosterone, may be present in up to 80% and 35% of cases, respectively.Moreover, from the point of view of imaging, POS is presented through the presence of ≥ 20 follicles of 2 to 9 mm and/or ovarian volume ≥ to 10cm³. It was concluded that POS can cause damage to the reproductive system, as well as due to its multisystemic repercussions, and it is possible in the diagnosis to observe the direct relationship of hyperandrogeny with the disease, on ultrasound imaging, in the clinic and in laboratory tests, the combination of these criteria occurs in the Rotterdam consensus. The correct and early diagnosis is indispensable for a good clinical outcome of patients.

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INTRODUCTION

Polycystic Ovary Syndrome (POC) is a heterogeneous endocrine condition quite common in women of childbearing age, being a frequent cause of infertility, affecting about 6-10% of the female population. This syndrome has a multisystemic character when it affects the reproductive and metabolic spheres, having a varied clinical presentation spectrum that encompasses hyperandrogenism, menstrual dysfunction, in addition to multiple ovarian follicles. (BELLVER *et al*., 2018; MARCONDES, BARCELLOS, ROCHA, 2011; GLUECK, GOLDENBERG, 2019; REHME *et al*., 2013; CORREIA, 2016; SANTOS, ÁLVARES, 2018; FEBRASGO, 2018). The pathophysiology is not yet fully understood, but it is known that hyperandrogenism has a prominent role. In summary, an inversion of the LH/FSH ratio that impacts on the reduction of androgen conversion into estrogen, generating hyperandrogeny, this in itself leads to follicular atresia in several phases of follicular development, justifying anovulation in POS. The increase in seeric androgens is related to dyslipidemias, hyperinsulinemia, acne, hirsutism and other alterations (BELLVER *et al*., 2018; SANCHEZ-GARRIDO, TENA-SEMPERE, 2020). Menstrual dysfunction caused by anovulation, in addition to oligo and/or amenorrhea, which are cycles lasting longer than 35 days or

even occurring up to 8 times within a period of one year. In the adolescent public, in particular, it is emphasized that such changes in the menstrual cycle are expected especially in the first two to three years after menarche, and may mask the picture of POS. Hyperandrogenemia is expressed by increasing androgen levels, especially total and free testosterone. In this sense, hyperandrogenism is clinically observed by hirsutism, acne, androgenic alopecia and seborrhea (AZZIZ *et al*, 2016; DABADGHAO, 2019;MARCONDES *et al*., 2011; CORREIA, 2016; SANTOS, ÁLVARES, 2018; REHME *et al*., 2013; CAPPOZI; SCAMBIA; LELLO, 2020). Moreover, we have that POS, because it is a syndrome, that is, an association of signs, symptoms and phenomena, the diagnosis is not only with a predominant symptom. Diagnosis commonly occurs by excluding other diseases that have a similar clinical picture. If done in a timely manner and, the diagnosis allows a good approach, minimizing other possible correlated problems, such as increased risk of insulin resistance, glucose intolerance, cardiovascular disease, type 2 diabetes mellitus and metabolic syndrome (MARCONDES, BARCELLOS, ROCHA, 2011, CORREIA, 2016; ÁLVARES, 2018; MALACHIAS, 2019; WANDERLEY *et al*, 2018). Therefore, this work aims to discuss the clinical-laboratory and imaging diagnosis of polycystic ovary syndrome.

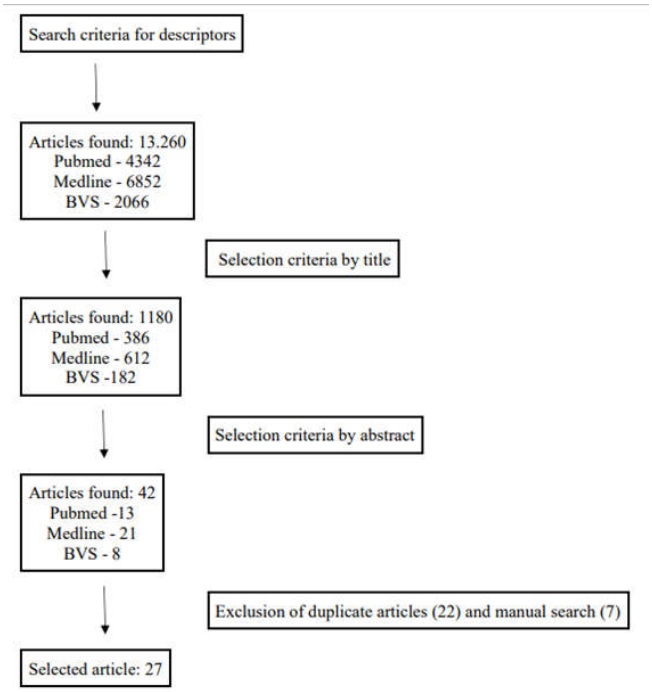
METODOLOGY

The method of choice for obtaining data was integrative review. Through this, it was possible to involve the main characteristics of interest of the theme, carefully following the steps of scientific production. Initially, the research-leading question was defined: What are the main diagnostic methods of Polycystic Ovary Syndrome?

The research platforms used for data collection were: PUBMED, MEDLINE and the virtual health library (VHL), using the descriptors: *"polycystic ovary syndrome", "diagnosis"; " aspects", clínico"markers", "diagnostic imaging"*.The inclusion criteria of the research: articles in English, Portuguese and Spanish available complete and online, published between 2016 and 2020. On the other hand, the exclusion criteria were: case reports, reports of experiences and editorials. A total of 13,260 articles were found, but only 1,180 articles were included. With the subsequent reading of the titles, only 20 articles were considered per majority approach to the theme as represented in Figure 1. For greater reliability and qualitative importance in the construction of the article database, manual screenings of other references were performed in order to increase production.

RESULTS AND DISCUSSIONS

Polycystic Ovary Syndrome (POS) is the most common cause of chronic anovulation and anovulatory infertility. It is also the most common endocrinopathy in menacme women associated with metabolic disorders and reproductive dysfunction. This syndrome can be defined based on clinical, biochemical and ultrasound imaging criteria, as observed in chart 1 (ANDRADE*et al*., 2016; AZZIZ *et al*., 2016; BELLVER *et al*., 2018; BOZDAG *et al*., 2016; MOHAMMAD, MOHAMMAD, SEGHINSARA, 2017; FEBRASGO, 2018). Regarding the clinical diagnosis, the diagnostic criteria were defined in 1990, during the conference of the National Institute of Health - NIH, in which POS was defined as hyperandrogenism and/or hyperandrogenemia with oligoovulation. Subsequently, these criteria were modified, the most current being the Rotterdam Consensus in 2003, whereby after confirming the absence of other causes of hyperandrogenism, at least 2 of the 3 criteria should be present, such as: ovulatory dysfunction; evidence of clinical hyperandrogenism (hirsutism, acne, androgenic alopecia) or laboratory (evidence of high concentrations of androgens); or polycystic appearance of the ovaries on pelvic ultrasound (ovarian volume above 10 cm^3 or presence of 12 or more follicles with 0.2 to 0.9 cm) (DUMESIC *et al*., 2015; FEBRASGO, 2018; LUA, HOW, KING, 2018; TEEDE *et al*., 2018). Moreover, it was observed the existence of criticisms of the Rotterdam criteria, especially given the possibility of performing, even without evidence of hyperandrogenism, of the diagnosis of POS. Thus, the Androgen Excess &POS Society stipulated that there is clinical or laboratory hyperandrogenism found and associated with anovulation or polycystic ovaries, giving a greater scope in the diagnoses. This criterion recognizes POS in women with hyperandrogenism who do not present anovulatory symptoms ("ovulatory POS"), which comprises about 10% of cases (MARCONDES *et al*., 2011; DUMESIC *et al*., 2015).



Source: author himself, 2020.

Figure 1. Methodological execution flowchart

The prevalence of POS is not well established in adolescence since the signs/symptoms that mimic POS overlap with the physiological changes of this phase of life, for this reason no statements about the diagnostic criteria of POS in adolescents were considered, since the risk of a misdiagnosis was high for adolescents who underwent only functional transient hyperandrogenism and menstrual changes(ANDRADE *et al*., 2016; DABADGHAO, 2019; WILLIAMS *et al*., 2016; TEEDE *et al*., 2018). In 2016, the Endocrine Society defined that the diagnosis of POS was retrospective, that is, analyzing the gynecological past of the young woman and considering more than two years after menarche. These adolescents should present chronic anovulation and hyperandrogenism. Currently, the retrospective diagnosis has been maintained and the

signs/symptoms are: presence of persistent oligo or amenorrhea, clinical or laboratory hyperandrogenism represented by severe acne resistant to topical treatment or moderate to severe hirsutism and high levels of total or free testosterone. (BELLVER *et al*., 2018;WILLIAMS *et al*., 2016; TEEDE *et al*., 2018; YELA *et al*., 2019; AKGÜL *et al*, 2018). Regarding clinical hyperandrogenism, the characterization of hirsutism can be made through the Ferriman-Galleway index, which analyzes nine androgen-dependent areas of the body, assigning scores from 0 to 4. According to the American Society of Reproductive Medicine (ASRM), the cutoff values for hirsutism characterization, using the ferriman index, are 4 and 6, respectively, for Eastern and other ethnic groups (AZZIZ *et al*., 2016; DUMESIC *et al*., 2015; LUA, HOW, KING, 2018, TEEDE *et al*., 2018). Laboratory, hyperandrogenemia, very marked in POS, represents a serum elevation of biochemical markers of androgen levels, and this alteration is present in up to 80% of patients. Such elevation is observed, above all, by the high dosage of total and free testosterone, the latter being the most important. Moreover, it can also be observed the increase in desidroepiandrosterone concentrations (DHEAS), which may be the only change in up to 25% of cases. Other analytes, such as androstenedione and DHEA, have debatable and unrobust value and importance in the characterization). of hyperandrogenemia (ESCOBAR-MORREALE, 2018). The most used methods in the determination of total testosterone are enzyme immunoassay and radioimmunoassay, which have divergences of 10 to 20% in the results, which occur mainly when the values are less than 250 ng/dL. In the case of total testosterone, the most used method ends up being the Vermeulen formula, even if the gold standard method isequilibrium dialysis (MARCONDES *et al*., 2011;ESCOBAR-MORREALE, 2018).

Taking into account the fact that testosterone dosage is the main laboratory change, the Rotterdam Consensus brings a critique in determining the elevation of testosterone levels. This is because there are possible factors of interference in its dosage, which brings to the fore caution in interpreting the results, especially in patients without clinical signs of excess androgens. Among these alteration factors, we highlight the presence of other steroids of similar structure in circulation (androstenedione, dihydrotestosterone and etc.), wide range of normality, variation of concentration throughout the day and absence of reference values established for sex and age, as well as the non-correlation with variables such as age group and BMI(SANCHEZ-GARRIDO, TENA-SEMPERE, 2020; MARCONDES *et al*., 2011; ESCOBAR-MORREALE, 2018)). The polycystic ovary in imaging is described since Stein and Leventhal, being defined in 1981 as an enlarged ovary of size containing an expressive number of follicles with 2 to 6 mm in diameter. Subsequently, this definition of polycystic morphology was expanded by Adam *et al*. (1985) as that of an ovary that contained at least 10 follicles, between 2 and 8 mm in diameter, arranged in an echogenic and hypertrophic stroma. (ROCHA, 2011; MARCONDES *et al*., 2011; McCARTNEY; MARSHALL, 2017). Other authors disregard stroma density and increase and adopt ovary volume > 10 cm³ as a value that correlates well with stroma volume and this definition was recommended by the Rotterdam consensus. Currently, according to asrm/eshre recommendations of 2018,the s parameters arethe presence of ≥ 20 follicles of 2 to 9 mm and/or ovarian volume ≥ to 10 cm³ in one or two ovaries, except for cases of functional cyst. In the latter case, the examination shall be redone in the subsequent cycle. (MARCONDES *et al*., 2011; McCARTNEY; MARSHALL, 2017; YELA *et al*., 2019). Because it is a syndrome, that is, a set of signs and symptoms, in cases of suspected POS, it is crucial to research other diseases that may question its clinical picture. Therefore, for the diagnosis of POS exclusion to be established, one must first research its differential diagnoses. In addition to a good anamnesis, complementary tests help significantly in this analysis. Therefore, it is important to rule out situations that also deal with hyperandrogenism, since it is one of the main characteristics of POS (TSIKOURAS *et al*, 2015; LUA, HOW, KING, 2018; YELA *et al*., 2019). In cases where there is no clear finding of the hyperandrogenic phenotype, it is recommended to investigate diseases that cause chronic anovulation. There is much divergence in the literature about which diseases should actually be investigated and excluded, but the main ones are: pregnancy, hypothyroidism, hyperprolactinemia, and Cushing's syndrome. Thus, prolactin and FSH dosages are sufficient in the characterization. We also have that tsh dosage may be useful in some cases, being altered in up to 20% of patients, by a change suggestive of metabolic profile. In addition to these causes of hyperandrogenism, ovarian tumor, adrenal tumor and congenital adrenal hyperplasia should also be investigated. Thus, they are important of the dosages of testosterone (total and free), DHEA-S and hydroxyprogesterone (17OHP), respectively, in the investigation. (TSIKOURAS *et al*, 2015; BELLVER *et al*., 2018; YELA *et al*., 2019).

Moreover, the consequences of POS are more than expected interferences in the reproductive axis, since patients with such syndrome are more prone to a series of clinical complications resulting from other comorbidities, such as the higher risk for hypertension, type 2 Diabetes Mellitus, hyperlipidemia, coronary artery disease and cerebral vascular disease. Furthermore, we have that women with POS have an endothelial weakening, which can be explained by obesity, a condition present in about 50% of these women(TSIKOURAS *et al*, 2015;CORREIA, 2016; YELA *et al*., 2019). It is also observed that the lipid profile in this syndrome tends to be atherogenic, in view of the classic increase in triglycerides, LDL and VLDL and decrease in HDL, causing this patient profile to have a high risk for metabolic syndrome, vascular disease. In addition to the aforementioned complications, it is observed that POS predisposes more risk to endometrial hyperplasia and carcinoma, due to the estrogenic levels of anovulatory cycles, mood disorders and complications during pregnancy(MARCONDES *et al*., 2011; REHME *et al*., 2013; CORREIA, 2016; WANDERLEY *et al*, 2018).

Conclusion

Polycystic Ovary Syndrome is a relevant theme about women's health, mainly due to its reproductive and multisystemic interfaces. It was possible to observe that the diagnosis of POS is multifactorial and begins with direct investigation of hyperandrogenia, ultrasound imaging studies and clinical history of anovulation, as standardized by the Rotterdam criteria. Imaging tests showed patterns of ovaries with 20 or more follicles of 2 to 9 mm and/or ovarian volume ≥10 cm³ in one or two ovaries, except for functional cysts. In the laboratory evaluation, the androgenic profile should be investigated with analysis of total serum testosterone levels and DHEAS, which will commonly be elevated. On clinical examination, observe signs caused by excess androgens, such

as severe acne and hirsutism. Anamnesis in POS cases is most often described as the anovulatory picture of patients, and the absence of this may hinder the diagnosis, which should be retrospective and the use of complementary tests to establish important differential diagnoses, such as prolactin, FSH and TSH dosage. Thus, it is important to have a correct, targeted, broad and early diagnosis, especially in adolescence, as an indispensable part for an adequate therapeutic approach and good clinical outcome of patients.

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The preferred spelling of the word "acknowledgment" in American English is without an "e" after the "g." Use the singular heading even if you have many acknowledgments.

REFERENCES

AKGÜL, S. *et al*. Do the different diagnostic criteria impact polycystic ovary syndrome diagnosis for adolescents?. Journal of pediatric and adolescent gynecology, v. 31, n. 3, p. 258-262, 2018.

ANDRADE, V. H. L. *et al*. Current aspects of polycystic ovary syndrome: A literature review. Revista da Associação Médica Brasileira, v. 62, n. 9, p. 867-871, 2016.

AZZIZ, R. *et al*. Polycystic ovary syndrome. Nature Reviews Disease Primers, v. 2, n. 1, p. 1-18, 2016.

BELLVER, J. *et al*. Polycystic ovary syndrome throughout a woman's life. Journal of Assisted Reproduction and Genetics, v. 35, n. 1, p. 25-39, 2018.

BOZDAG, G. *et al*.. The prevalence and phenotypic features of polycystic ovary syndrome: a systematic review and meta-analysis. Human Reproduction, v. 31, n. 12, p. 2841-2855, 2016.

BRAZILIAN FEDERATION OF GYNECOLOGY AND OBSTETRICASSOCIATIONS (FEBRASGO). Polycystic ovary syndrome. São Paulo: Brazilian Federation of Gynecology and Obstetrics Associations (FEBRASGO), 2018.

CAPOZZI, A.; SCAMBIA, G.; LELLO, S. Polycystic Ovary Syndrome (POS) and adolescence: how can we manage it?. European Journal of Obstetrics & Gynecology and Reproductive Biology, v; 250, p. 235-240, 2020.

CORREIA, D. Computational Analysis of Ovarian Images in the diagnosis of polycystic ovary syndrome. Revista de Medicina (São Paulo), v. 97, n. 4, p. 402-6, 2016.

DABADGHAO, P. Polycystic ovary syndrome in adolescents. Best Practice & Clinical Research Endocrinology & Metabolism, v. 33, n. 3, p. 101272, 2019.

DUMESIC, Daniel A. *et al*. Scientific statement on the diagnostic criteria, epidemiology, pathophysiology, and molecular genetics of polycystic ovary syndrome. Endocrine Reviews, v. 36, n. 5, p. 487-525, 2015.

ESCOBAR-MORREALE, H. F. Polycystic ovary syndrome: definition, aetiology, diagnosis and treatment. Nature Reviews Endocrinology, v. 14, n. 5, p. 270, 2018.

GLUECK, J.J.; GOLDENBERG, N. Characteristics of obesity in polycystic ovary syndrome: etiology, treatment, and genetics. Metabolism, v. 92, p. 108-120, 2019.

JUNQUEIRA, P.A.A.; FONSECA, A. M.; ALDRIGHI, J. M. Polycystic ovary syndrome. Revista da Associação Médica Brasileira., São Paulo , v. 49, n. 1, p. 13-14, Jan. 2003.

MALACHIAS, M. V. B. POSis Ovary Syndrome and Cardiovascular Diseases: A Door Still Open. Arquivos Brasileiros de Cardiologia, v. 112, n. 4, p. 430-431, 2019.

MARCONDES, J.A.M.; BARCELLOS, C.R.G; ROCHA, M. P. Difficulties and pitfalls in the diagnosis of polycystic ovary syndrome. Brazilian Archives of Endocrinology & Metabology, v. 55, n. 1, p. 6-15, 2011.

MCCARTNEY, Christopher R.; MARSHALL, John C. Polycystic ovary syndrome. New England Journal of Medicine, v. 375, n. 1, p. 54-64, 2016.

MOON, A. C.Y.; HOW, C. H.; KING, T. F. J. Managing polycystic ovary syndrome in primary care. Singapore Medical Journal, v. 59, n. 11, p. 567-571, 2018.

REHME, M. F. B. *et al*. Clinical, biochemical, ultrasound and metabolic manifestations of polycystic ovary syndrome in adolescents. Brazilian Journal of Gynecology and Obstetrics, v. 35, n. 6, p. 249-254, 2013.

SANCHEZ-GARRIDO, M. A.; TENA-SEMPERE, M. Metabolic dysfunction in polycystic ovary syndrome: Pathogenic role of androgen excess and potential therapeutic strategies. Molecular Metabolism, v. 35, p. 100937, 2020.

SANTOS, R. M.; ÁLVARES, A. C. M. Literature review on polycystic ovary syndrome. Journal of Scientific Initiation and Extension, v. 1, n. Esp 2, p. 261-265, 2018.

TEEDE, H. J. *et al*. Recommendations from the international evidence-based guideline for the assessment and management of polycystic ovary syndrome. Human Reproduction, v. 33, n. 9, p. 1602-1618, 2018.

TSIKOURAS, P. *et al*. Features of polycystic ovary syndrome in adolescence. Journal of Medicine and Life, v. 8, n. 3, p. 291, 2015.

WANDERLEY, M. S. *et al*. Association between insulin resistance and cardiovascular risk factors in patients with polycystic ovary syndrome. Brazilian Journal of Gynecology and Obstetrics, v. 40, n. 4, p. 188-195, 2018.

WILLIAMS, T.; MORTADA, R.; PORTER, Samuel. Diagnosis and treatment of polycystic ovary syndrome. American Family Physician, v. 94, n. 2, p. 106-113, 2016.

YELA, D. A. *et al*. Polycystic ovary syndrome-Concept, epidemiology and pathophysiology applied to clinical practice. Femina, p. 518-545, 2019.

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