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MULTIPARAMETRIC ULTRASOUND IN THE DIAGNOSIS OF POLYCYSTIC OVARY SYNDROME IN INFERTILE WOMEN: CURRENT EVIDENCE AND OPEN QUESTIONS

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Relevance. Polycystic ovary syndrome (PCOS), renamed in 2026 as polyendocrine metabolic ovarian syndrome, affects about 10% of women of reproductive age under the Rotterdam criteria and is the leading cause of anovulatory infertility [1, 2]. Transvaginal two-dimensional (2D) ultrasound remains the main imaging method, but follicle counting depends on the operator and on transducer resolution, and the ovarian stroma, which is linked to hyperandrogenism, is assessed only subjectively. Multiparametric ultrasound, combining 2D morphometry, three-dimensional (3D) volumetry, Doppler and elastography, may give a more complete picture of the ovary.

Aim. To analyse published evidence on the diagnostic value of individual components of multiparametric ultrasound in PCOS and to define the tasks for a prospective study in infertile women.

Materials and methods. International guidelines, meta-analyses and controlled diagnostic studies published between 1985 and 2026 and indexed in PubMed, Scopus and Google Scholar were reviewed. Twenty-three sources meeting the inclusion criteria were analysed.

Results. The ultrasound threshold for polycystic ovarian morphology has risen from 12 to 20 follicles per ovary as transducers improved; the 2023 International Guideline recommends a follicle number per ovary of 20 or more, or an ovarian volume of 10 mL or more [2]. A stroma-to-ovarian area ratio above 0.32 was the best ultrasound predictor of elevated androgens in a multicentre study of 418 women [3]. Automated 3D counting (SonoAVC) detected more follicles than 2D scanning and reduced examination time from 275 to 103 seconds [4]. A meta-analysis of 27 Doppler studies (2,377 women) showed higher vascularisation indices and lower resistance (RI) and pulsatility (PI) indices of stromal flow in PCOS; RI correlated inversely with testosterone ($r = -0.48$) [5]. A meta-analysis of eight elastography studies confirmed greater ovarian stiffness in PCOS (standardised mean difference 1.86 for shear wave elastography) [6], although two earlier studies found no difference. In a recent study, a stiffness cut-off of 12.5 kPa gave an AUC of 0.816, and stiffness correlated with AMH ($r = 0.68$) [7]. Doppler and elastography values varied widely between studies because of different cycle timing, equipment and measurement technique, and no validated cut-off values exist.

Conclusions. Each component of multiparametric ultrasound adds information on the follicular, stromal, vascular and mechanical state of the ovary that 2D follicle counting does not provide. However, none of the new parameters is yet validated as an independent diagnostic criterion. A standardised protocol, performed in the early follicular phase and interpreted together with hormonal and metabolic markers, should be tested in a prospective study of infertile women with a fertile control group, with phenotype-specific reference values.

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