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CLASSICS IN ABDOMINAL RADIOLOGY

The ovarian "string-of-pearls" sign

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The "string-of-pearls" appearance (Fig. 1) has been associated with several conditions in the abdomen. The presence of this sign in the ovary may be an indication of polycystic ovarian syndrome (PCOS). Stein and Leventhal were the first to describe the association of amenorrhea, obesity, and masculinizing physical findings with multiple ovarian cysts, as seen on surgically obtained wedge biopsies [1]. Today, the imaging illustration of multiple small, similarly sized follicles, often located peripherally in the ovary and resembling the namesake sign, is included in the diagnostic criteria for PCOS.

PCOS is now recognized as the most common endocrine abnormality in women of reproductive age, affecting 4–5 million women in the United States [2] and estimated to have a prevalence of 6–10% worldwide [3]. When clinically suspected on the basis of menstrual dysfunction, hyperandrogenism, and/or metabolic issues such as obesity, diabetes, and fatty liver disease [4], pelvic ultrasound including transvaginal imaging is often used in the investigation of these complaints. The findings of multiple (> 25), small (< 10 mm diameter), peripherally located follicles which in cross section resemble a pearl necklace (Fig. 2) in enlarged ovaries (volume > 10 cc) should prompt consideration of the diagnosis [4], even if only one ovary is involved [5]. Similar findings have also been reported with magnetic resonance imaging studies (Fig. 3) [2].

Because PCOS carries with it significant health risks including infertility, endometrial hyperplasia, and aforementioned cardiometabolic disease, the imaging presence of the ovarian string-of-pearls sign warrants correlation with clinical and laboratory evaluation to confirm the

Fig. 1 Metaphorical representation of a string-of-pearls. (*Source* "Necklace—Large Pearl Beads, Bernice Kopple, circa 1960s–1970s" by Taryn Ellis licensed under CC BY 4.0, without modification. Refer to creativecommons.org/licenses.)

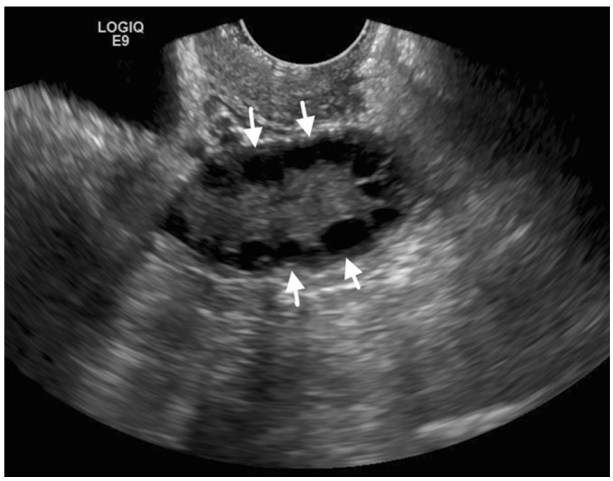

Fig. 2 Longitudinal grayscale image from a transvaginal pelvic ultrasound demonstrates multiple small peripherally arranged follicles (arrows) giving the characteristic "string-of-pearls" appearance in this patient with clinically proven PCOS

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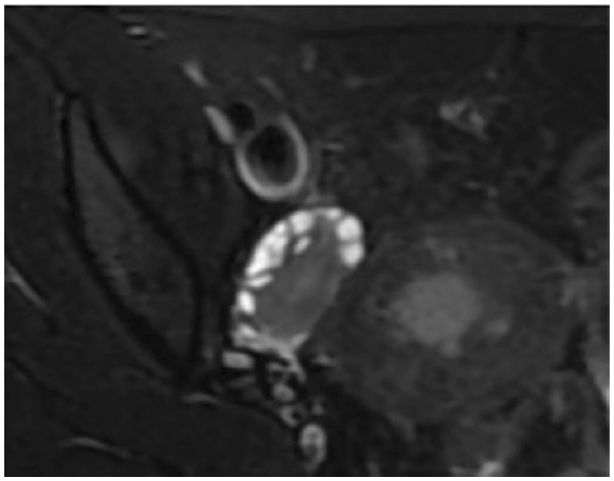

Fig. 3 Axial T2-weighted MR image from another patient who has been clinically diagnosed with PCOS shows a similar distinctive follicle morphology of the right ovary. (Image courtesy of Avisha Singla, MD, of the Kempegowda Institute of Medical Sciences)

diagnosis, such that other conditions may be excluded and the potential complications of the syndrome may be addressed.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Research involving human and animal rights This article does not contain any studies with human participants or animals performed by any of the authors.

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