Diagnosis of polycystic ovary syndrome (PCOS) in adolescents using MRI

Background

Polycystic ovary syndrome (PCOS) is the most common ovarian dysfunction, with a prevalence of 6% to 15% of women (1).

Early diagnosis is required to inform patients and start prevention against potential complications—particularly infertility.

Objective: To evaluate the validity and reproducibility of MRI for the diagnosis of PCOS in adolescent girls.

Methods

Prospective (2014-2015) and retrospective (2006-2014) study. Two independent analysis (MF and VH) of 50 randomly-selected MRIs from the PCOS cases.

Population

- Girls aged 11-18
- Pelvic MRI
- Complete pubertal development (US/MRI): Tanner stages B5 or pubescent uterus (I):
  - uterus size > 3.5 cm
  - fundal-cervical ratio > 1
  - midline endometrial echo

Clinical or biochemical suspicion of PCOS ≥ 1 of the Rotterdam criteria (2):

1. Clinical hyperandrogenism:
   - Hirsutism / severe acne
2. Biochemical hyperandrogenism:
   - Total testosterone ≥ 0.5 nmol/L
3. Menstrual irregularities:
   - Amenorrhea / oligomenorrhea
   - Hormone treatment
   - Anovulation due to other causes
   - Uninterpretable MRI images
   - Hip and back pain
   - No hyperandrogenism
   - Regular menstrual cycle

Quantitative criteria (both ovaries) (average).

Ovarian volume (cm³)
Follicle number per ovary for follicles ≤ 9 mm and ≤ 5 mm
Sphericity index

Analysis

Quantitative criteria (both ovaries) (average).

- Ovarian volume
- Follicle number
- Sphericity index

Validity of MRI-based criteria

- Sensitivity (%)
- Specificity (%)
- ROC curve

RMP: Reference MRI protocol

Reproducibility of MRI-based criteria measures

- Correlation coefficient
- 95% CI

Conclusion

MRI is a valuable tool to confirm PCOS in adolescent girls based on clinical and hormonal characteristics when transvaginal US cannot be performed. The most accurate diagnostic criteria by MRI were FNPO ≥ 9 mm, ovarian volume, and peripheral distribution of follicles. The most reliable criterion was ovarian volume.

In the future, these MR criteria could be tested in a larger cohort of adolescents with only isolated menstrual irregularities. This would be an important step toward early diagnosis of PCOS versus transient physiological menstrual irregularities which are frequent at puberty.

References