15c. Poly Cystic Ovarian Syndrome (PCOS)

Unit 15(c): Polycystic Ovarian Syndrome (PCOS)

Learning Goals

By the end of this chapter, you should be able to:

- define **PCOS** and apply **diagnostic criteria** (including adolescent-specific cautions);
- explain **pathophysiology** linking insulin resistance, hyperandrogenism, and anovulation;
- take a focused history and perform examination; choose appropriate **investigations** and **screening**;
- plan **management** for cycle regulation, hirsutism/acne, fertility, and metabolic health;
- counsel on **long-term risks** and follow-up; relate modern concepts to Ayurvedic constructs (e.g., *Kaphaja ārtava-duṣṭi*, *medoroga*).

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1) What is PCOS?

PCOS is a common endocrine–metabolic disorder of reproductive-age women characterised by a combination of **ovulatory dysfunction** and **hyperandrogenism**, with or without **polycystic ovarian morphology** (PCOM) on ultrasound, **after excluding other causes**. Diagnostic frameworks include the **Rotterdam consensus (2003)** and its evidence-based updates (2018, 2023). The **2023 International Guideline** remains the most comprehensive, harmonising assessment and management across life stages.

PCOS 3D model

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2) Pathophysiology

1. **Insulin resistance (IR)** (present across BMI spectrum) → compensatory **hyperinsulinaemia**.
2. Insulin (with LH) stimulates **theca cells** → ↑ ovarian androgen synthesis (testosterone, androstenedione).
3. **Hyperandrogenism** → follicular arrest, **anovulation/oligo-ovulation**, and clinical signs (hirsutism, acne).
4. Insulin suppresses hepatic **SHBG**, increasing **free** androgens.
5. Ovaries often show **increased antral follicle count/volume** (PCOM).
6. Systemic IR contributes to **dyslipidaemia, glucose intolerance, and NAFLD**; psychosocial stressors may exacerbate symptoms.

*(Mnemonic: **I→A→O** — Insulin resistance → Androgens rise → Ovulation fails.)*

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3) Diagnostic Criteria

3.1 Rotterdam (2003)—adult diagnosis

Any two of the following three, after excluding mimics:

1. **Oligo-/anovulation**,
2. **Hyperandrogenism** (clinical and/or biochemical),
3. **Polycystic ovarian morphology (PCOM)** on ultrasound.

PCOM thresholds (updated): Using high-frequency transvaginal probes (≥8 MHz), evidence-based updates increased

the follicle number per ovary (FNPO) threshold to **≥20–25 follicles** and/or ovarian volume **≥10 mL** (probe-dependent). Your exam answer should state that **recent guidelines raised FNPO compared with the original 12-follicle cutoff**.

3.2 Adolescents (avoid over-diagnosis)

- **Do not** diagnose PCOS within **<8 years post-menarche** based on ultrasound or AMH alone (physiologically multifollicular ovaries are common).
- Require **both**: (i) **persistent ovulatory dysfunction** (abnormal cycles beyond normal maturation), and (ii) **clinical/biochemical hyperandrogenism**; use ultrasound/AMH only **≥8 years post-menarche**.

3.3 Exclude mimics

- **Thyroid** dysfunction, **hyperprolactinaemia**, **non-classic CAH** (17-OHP), **Cushing syndrome**, **androgen-secreting tumours**, pregnancy-related states, hypothalamic amenorrhoea, premature ovarian insufficiency.

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4) Clinical Features

- **Menstrual**: oligomenorrhoea, amenorrhoea, irregular cycles, anovulatory AUB.
- **Hyperandrogenism**: hirsutism (assess **mFG score**), acne, androgenic alopecia.
- **Metabolic**: overweight/central adiposity, IR features (acanthosis nigricans), dyslipidaemia, elevated BP; ↑ risk of **impaired glucose tolerance/Type 2 DM**.
- **Psychosocial**: anxiety, depression, body-image distress, sexual dysfunction; screen and support.
- **Pregnancy risks**: GDM, hypertensive disorders, preterm birth (optimize preconception health).

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5) Focused Evaluation

5.1 History

- Cycle pattern; infertility duration; symptoms of hyperandrogenism; weight trajectory; sleep/snoring (OSA risk); mood; medication history (e.g., valproate, steroids).

5.2 Examination

- BMI, **waist circumference** (central obesity), BP; skin (acanthosis, acne, alopecia); **Ferriman–Gallwey** score; thyroid/breast exam.

5.3 Investigations (tailored)

- **Pregnancy test** when indicated.
- **TSH, prolactin** (rule-outs); **17-OHP** if hyperandrogenism severe/early.
- **Total & free testosterone** (or calculated free androgen index) where available.
- **OGTT** (fasting and 2-h) or at least fasting glucose/HbA1c; **lipid profile**; **ALT** (NAFLD risk).
- **Transvaginal USG** for PCOM when criteria applicable; in adolescents/virginal: trans-abdominal with caution, but **not** used to diagnose PCOS <8 years post-menarche.

Guideline pearl: The **2023 International Guideline** recommends routine **metabolic screening** (glucose intolerance, lipids, BP), mental health screening, and lifestyle assessment at baseline and follow-up.

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6) Management (structured by goals)

Principles: Treat what **matters to the patient**—cycle control/endometrial protection, cosmetic symptoms, fertility, and metabolic risk modification. Start with **lifestyle** in all phenotypes.

6.1 Lifestyle (first line for all)

- **Nutrition:** No single superior diet; create a sustainable **energy deficit** if overweight; emphasise whole foods, adequate protein, fibre.
- **Physical activity:** Aim for **≥150 min/week** moderate aerobic + **2–3** resistance sessions; increase daily NEAT.
- **Behavioural support:** sleep regularity, stress management; address emotional eating.
- **Targets:** Even **5–10% weight loss** can restore ovulation and improve metabolic markers; but benefits extend **regardless of weight loss** (exercise improves IR).

6.2 Menstrual regulation & endometrial protection

- **Combined oral contraceptive pills (COCPs)**: first-line for **irregular menses**, **hirsutism/acne** when pregnancy is **not desired**. Choose low-dose ethinyl-estradiol with a **neutral/antiandrogenic progestin**; reassess BP/VTE risk.
- **Cyclic progestin** (e.g., medroxyprogesterone 10 mg × 10–14 days monthly) if COCP is contraindicated or declined—prevents **endometrial hyperplasia** in chronic anovulation.
- **LNG-IUS** provides long-term endometrial protection and reduces HMB.

6.3 Hirsutism/acne

- **COCPs** first-line; add **spironolactone** (50–100 mg bd) if persistent after 6 months—**ensure reliable contraception** (teratogenic risk to male fetus).
- **Topical eflornithine** for facial hair; consider **laser/IPL** as adjunct.
- Reassess for **non-classic CAH** or androgen-secreting tumours if severe/rapid-onset.

6.4 Infertility—ovulation induction (OI)

- **Letrozole** is recommended **first-line OI** in anovulatory PCOS; it improves ovulation, clinical pregnancy, and **live birth** rates vs clomiphene. If no response, escalate dose per protocol.
- **Clomiphene citrate** (second line or if letrozole unavailable); may be combined with **metformin** in IR/overweight phenotypes.
- **Gonadotropins** with careful monitoring if oral agents fail; **OHSS** risk counselling essential.
- **Laparoscopic ovarian drilling** (selected CC-resistant cases) when ART is not feasible.
- **IVF/ICSI** for additional infertility factors or OI failure.

6.5 Metformin—where it fits

- Improves **insulin sensitivity**; supports **cycle regularity** and **metabolic** outcomes; typically considered in **BMI ≥25 kg/m²** or impaired glucose tolerance, and **with** lifestyle measures. In infertility, metformin is **adjunct** (not a replacement for letrozole).

6.6 Adolescents

- Avoid labelling too early; treat **symptoms**: COCPs for cycles/acne; **metformin** for IR and weight issues; strong focus on **behavioural and family-based lifestyle** interventions. Ultrasound/AMH do **not** diagnose PCOS before 8 years post-menarche.

6.7 Pregnancy & preconception

- Optimise **weight, glycaemia, BP**; start folic acid; screen for **GDM risk** early; discuss medication safety (stop anti-androgens; review metformin per clinician plan).

7) Long-Term Risks & Follow-Up

- **Type 2 diabetes/IGT:** periodic **OGTT** (especially if BMI≥23 in South Asians, prior GDM, or strong family history).
- **CVD risk factors:** BP, **lipids**, central adiposity; encourage exercise long-term (even if weight plateaus).
- **Endometrial hyperplasia/cancer:** risk rises with chronic anovulation—ensure **regular withdrawal bleeds** or continuous endometrial protection.
- **Mental health:** screen for anxiety/depression; offer counselling/cognitive-behavioural strategies.
- **Sleep apnoea/NAFLD:** consider if symptomatic (snoring/daytime sleepiness) or if ALT elevated.

> The 2023 Guideline emphasises **holistic, lifelong care**, including mental health and cardio-metabolic screening, not just reproductive outcomes.

8) Integrative Notes for BAMS Students

- **Ayurvedic mapping:** PCOS presentations often resemble **Kaphaja ārtava-duṣṭi** (thick/late flow, heaviness), **Artava-kṣaya/Anartava** (oligo/amenorrhoea), and **medoroga/kapha-meda āvaraṇa** of **Apāna-vāta**.
- **Pathya-āhāra–vihāra:** light, warm, freshly cooked food; reduce **guru-snigdha-madhura** excess; regular dinacaryā, **vyāyāma** with resistance work; sound sleep.
- **Śamana supports (post-screening):** *Triphala*, *Guggulu* formulations (for **lekhana**), *Śatāvarī/Aśoka* for cycle support; avoid any **rajopravartaka** if pregnancy is possible; **do not** substitute for infection/surgical care.
- **Pañcakarma: Basti** is described for *vāta-pradhāna* states; consider only in supervised settings after excluding pregnancy and acute pelvic infection.

(Use this integrative lens for discussion; write modern criteria and management precisely for scoring.)

9) High-Yield Tables

A. When to suspect PCOS vs mimics

Feature	PCOS	Non-classic CAH	Cushing	Androgen-secreting tumour
Onset	Adolescence/early adult; gradual	Often adolescence; family hx	Any age; proximal myopathy, striae	Rapid (<6–12 mo) virilisation
Menses	Oligo/amenorrhoea	Often irregular	Irregular	Often amenorrhoea
Androgens	Mild–moderate ↑	17-OHP ↑	Cortisol excess	Markedly ↑ testosterone/DHEA-S
Metabolic	IR common	Variable	Central obesity, HTN	Not typical
Next test	OGTT, lipids, TSH/prolactin	**17-OHP**	Low-dose DST	Imaging + tumour markers

B. Adult diagnosis—what to write in one line

"PCOS = **2 of 3 (OA / HA / PCOM)** after exclusions; **adolescents** require **HA + ovulatory dysfunction**, no ultrasound-based diagnosis before **8 years post-menarche**."

10) Ten-Point Quick Revision

1. Use **Rotterdam** framework with 2023 updates; **raise FNPO cutoff** with high-frequency probes.
2. Adolescents: **do not** diagnose with ultrasound/AMH <8y post-menarche; need **HA + ovulatory dysfunction**.
3. Screen **metabolic & mental health** at baseline; repeat periodically.
4. Lifestyle is **first-line for all**; 5–10% weight loss helps—but exercise benefits even without weight loss.
5. **COCPs** regulate cycles and help hirsutism/acne (if pregnancy not desired).
6. Ensure **endometrial protection** (COCPs, cyclic progestin, or LNG-IUS) in chronic anovulation.
7. **Letrozole** is **first-line** ovulation induction; clomiphene second line.
8. Add **spironolactone** for hirsutism only with **effective contraception**.
9. Consider **metformin** for IR/metabolic risk and as adjunct in infertility.
10. Always **exclude mimics**: thyroid, prolactin, CAH, Cushing, tumours.

Assessment

A) MCQs (one best answer)

1. Adult diagnosis of PCOS (Rotterdam) requires:
   A. All three features present
   B. **Any two of: oligo-/anovulation, hyperandrogenism, PCOM**
   C. Hyperandrogenism mandatory
   D. Ultrasound mandatory
   Answer: B.
2. The updated follicle number per ovary (FNPO) threshold with high-frequency probes is closest to:
   A. ≥12 B. ≥15 C. **≥20–25** D. ≥30
   Answer: C.
3. In adolescents (<8 y post-menarche), PCOS diagnosis should **not** rely on:
   A. Hyperandrogenism
   B. Ovulatory dysfunction
   C. **Pelvic ultrasound/AMH**
   D. Menstrual history
   Answer: C.
4. First-line drug for ovulation induction in anovulatory PCOS:
   A. Clomiphene B. **Letrozole** C. Metformin alone D. Gonadotropins
   Answer: B.
5. For irregular cycles with no pregnancy desire, first-line therapy is:
   A. **COCPs** B. Spironolactone alone C. GnRH agonist D. Only lifestyle
   Answer: A.
6. In PCOS, endometrial protection in chronic anovulation can be provided by:
   A. COCPs B. **Cyclic progestin** C. LNG-IUS D. **All of the above**
   Answer: D.
7. A woman on spironolactone must also:
   A. Take folate
   B. Avoid sunlight
   C. **Use reliable contraception**
   D. Take calcium supplements
   Answer: C.
8. Which is **not** a typical PCOS mimic?
   A. Non-classic CAH B. Hypothyroidism C. **Endometriosis** D. Cushing syndrome
   Answer: C.
9. Routine baseline screens in PCOS include:
   A. OGTT or fasting glucose/HbA1c B. Lipids and BP C. Mental health screen
   D. **All of the above**

Answer: D.

10. A raised total/free testosterone with rapid-onset virilisation warrants:
    A. Start COCPs
    B. **Urgent evaluation for androgen-secreting tumour**
    C. Start metformin only
    D. Observation
    Answer: B.

B) Short Answer Questions (3–5 lines each)

1. Write the **Rotterdam criteria** and list two conditions that must be **excluded** before diagnosing PCOS.
2. Explain **why letrozole** is preferred over clomiphene for ovulation induction.
3. Outline **adolescent-specific** diagnostic cautions and initial management priorities.
4. List the **baseline metabolic screens** and how often you would repeat them in a symptomatic patient.
5. Describe a **stepwise plan** to manage hirsutism in a woman who does not desire pregnancy.

C) Long Answer Questions

1. **Describe PCOS** under the following heads: definition, diagnostic criteria (adult vs adolescent), pathophysiology (IR–HA–anovulation), clinical features, differential diagnosis, investigations, and comprehensive management (lifestyle, cycle control, hirsutism, fertility, metabolic health, follow-up). Support with current guideline points.
2. A 26-year-old with BMI 29, oligomenorrhoea, hirsutism (mFG 12), and infertility ×1 year asks for pregnancy. **Write your plan**, including preconception optimisation, first-line OI choice (dose/escalation), when to add metformin, and escalation pathways (gonadotropins/IVF), with safety counselling.

D) OSCE-Style Checklists (examiner marking points)

- **Station 1: Diagnostic OSCE**
  Candidate states **2-of-3 Rotterdam**, mentions **raised FNPO threshold**, lists **exclusions** (TSH, prolactin, 17-OHP, Cushing, tumours).
- **Station 2: Lifestyle counselling**
  Explains energy deficit, **150 min/week** activity + resistance, sleep hygiene; sets **5–10% weight-loss** goal; plans follow-up.
- **Station 3: Hirsutism plan**
  COCP first-line; add **spironolactone** after 6 months with **contraception**; adjunct **eflornithine/laser**; reviews in 3–6 months.
- **Station 4: Infertility pathway**
  Letrozole first-line → dose escalation → add Metformin if IR/overweight → Gonadotropins with monitoring → IVF if needed; **OHSS** and multiple pregnancy risks discussed.
