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Image Challenge

# Irregular Periods and Enlarged Ovaries

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A 20-year-old woman was referred by her gynaecologist due to a two-year history of irregular menstrual cycles and an abnormal pelvic ultrasound. She reported a reduced appetite but denied other symptoms such as abdominal pain or hirsutism. Her past medical history is unremarkable, and she is not currently taking any medications.

Pelvic ultrasound revealed a normal uterus; however, both ovaries were significantly enlarged - measuring 7.5 cm on the right and 9.0 cm on the left - with multiple large cysts noted bilaterally (figure 1)

## What are the differential diagnoses?

**Polycystic ovarian syndrome (PCOS)**
PCOS typically presents with enlarged ovaries containing multiple small follicles of 2-9mm in diameter being arranged in a peripheral pattern, described as a string of pearls appearance. There is increased stromal echogenicity.

**Spontaneous ovarian hyper stimulation syndrome**
In ovarian hyperstimulation syndrome (OHSS), the ovaries are typically markedly enlarged, often measuring between 5 to 12 cm or more in diameter. They contain numerous cysts of varying sizes within the ovarian stroma. In more severe cases, the condition may be associated with the presence of ascites and other systemic manifestations.

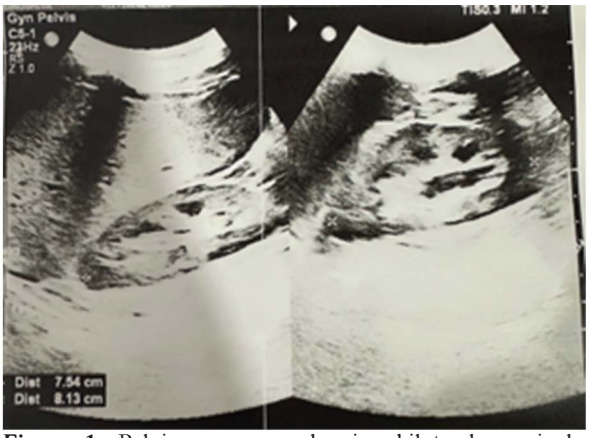


**Figure 1:** Pelvic sonogram showing bilateral massively enlarged ovaries (>70ml in volume) with multiple large cysts of varying sizes

**Endometriomas**
Endometriosis are typically shows well defined fluid filled cysts within the ovary. The fluid contains echoes and appear as ground glass or chocolate cyst due to old blood. The cyst wall may appear thick, irregular and with internal septation.

**Ovarian cancer**
This can present as a large mass often containing solid or mixed solid and cystic components giving multilocular appearance. Papillary structures extending from the tumour into the cystic space is strong indicator for malignancy

## What is the radiological diagnosis?

Ovarian hyperstimulation syndrome (OHSS)
Iatrogenic and spontaneous OHSS is generally seen in pregnancy. Non pregnant spontaneous OHSS is very rare and can occur in primary hypothyroidism, follicle-stimulating hormone (FSH) secreting pituitary adenoma and FSH receptor mutation.

## What are the investigations?

Tumour markers and beta hCG were negative. Endocrine evaluation showed severe primary hypothyroidism with Thyroid-stimulating hormone (TSH) of more than 150mIU/L, and very low free T4 of 1,53pmol/L. Prolactin was elevated (900 mIU/L), luteinizing hormone (LH) and follicle-stimulating hormone (FSH) were within normal range (1 mIU/L and 9.4mIU/L respectively)

## What is the diagnosis?

Spontaneous OHSS secondary to untreated severe hypothyroidism

## What are the pathophysiological association between OHSS and hypothyroidism?

Several hypotheses have been proposed to explain ovarian cyst formation in the context of severe hypothyroidism:

**1. TSH Cross-Reactivity:**
TSH, FSH, and LH are glycoproteins that share a common alpha subunit. In severe hypothyroidism, markedly elevated TSH levels may exert weak FSH- and LH-like activity, potentially leading to luteinized cyst formation in the ovaries.

**2. Direct Ovarian Sensitization:**
TSH may stimulate nuclear thyroid hormone receptors within granulosa cells, thereby enhancing ovarian sensitivity to circulating gonadotropins and promoting cyst development.

**3. Altered Steroidogenesis:**
Myxomatous infiltration, a characteristic feature of severe hypothyroidism, may disrupt normal steroidogenesis within the ovaries, contributing to cyst formation.

**4. Altered Estrogen Metabolism:**
In hypothyroidism, there is a shift in estrogen metabolism favoring the production of estriol via the 16-hydroxylation pathway, rather than estradiol. Estriol has weaker negative feedback on the hypothalamic-pituitary axis, potentially resulting in increased gonadotropin secretion and subsequent ovarian stimulation.

## What is the treatment and follow-up?

She was commenced on thyroxine at a dose of 100 micrograms daily. After three months of treatment, her thyroid function normalised, with a TSH level of 2.1 mIU/L. A repeat pelvic ultrasound performed at that time demonstrated significant improvement in ovarian size, with the ovarian volume reducing from 70 mL to 20 mL (Figure 2).

## What are the key learning points?

Hypothyroidism should be considered in the differential diagnosis of females with multicystic ovarian tumors and treatment with thyroxine can effectively reduce ovarian size and resolve cysts.

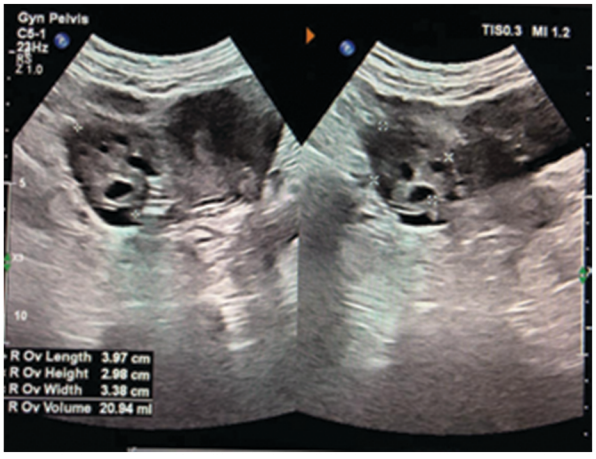


**Figure 2:** Repeat sonogram showing multi cystic ovary with improved ovarian size compared to pre-treatment scan

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