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# A patient with advanced breast cancer and hyperthyroidism associated with struma ovarii

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Germinal tumours account for 15–20% of all ovarian cancers, with the majority being mature cystic teratomas [1]. Struma ovarii is a monodermal type of ovarian teratoma composed predominantly of thyroid tissue (> 50%), which comprises about 3% of all ovarian teratomas [2]. It is usually encountered in women in the 5th and 6th decades of life and manifests as a unilateral ovarian tumour, usually located on the left side [3].

In most cases, struma ovarii is hormonally inactive. According to the literature, signs of hyperthyroidism have been reported only in 8% of cases [4].

We present a case of a 45-year-old woman with advanced breast cancer and a right ovarian tumour that proved to be a hormonally active struma ovarii.

A 45-year-old woman with hyperthyroidism and nodular cervical goitre was referred to the Endocrinology Department to receive hyperthyroidism treatment before an emergency right ovary tumour resection.

The patient had left breast cancer [cT2N1M1 no special type (NST) G3, triple negative breast cancer (TNBC), proliferation marker (Ki-67) — 77%], liver metastasis, and an ovary tumour, which was considered a possible metastasis. Transvaginal ultrasound showed heterogenous right ovary mass (10 × 7 cm) and no signs of ascites.

A computed tomography (CT) scan (Fig. 1) revealed a heterogeneous pelvic mass (82 × 105 × 80 mm) with features of central necrosis, located in the midline, slightly to the right, causing uterus, sigmoid, and rectum displacement. There were no signs of tumour infiltration.

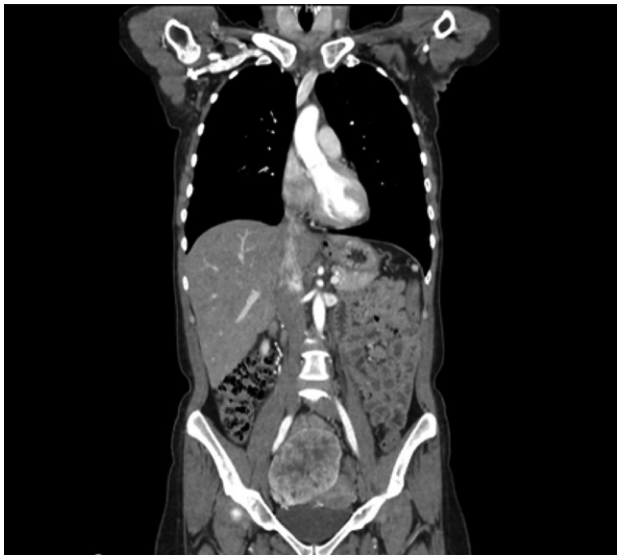

**Figure 1.** *Frontal view of computed tomography (CT), which revealed a heterogeneous pelvic mass with a hypodense central area and peripheral enhancement*

Because of the breast cancer, the patient had undergone a chemotherapy (paclitaxel + carboplatin), which was discontinued due to neutropaenia. Nonetheless, stable remission was achieved. At that time the patient was undergoing metronomic Endoxan chemotherapy.

In the context of endocrine disorders, the patient had a positive family history — a grandmother, a mother, and a brother had thyroid diseases. However,

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the patient did not report having similar conditions in the past.

Numerous imaging tests with iodinated contrast conducted within the last 4 months were considered a potential underlying cause of hyperthyroidism.

Due to positive reverse transcription polymerase chain reaction (RT-PCR) SARS-CoV2 test, the patient was hospitalized initially in a temporary COVID-19 unit with neutropaenia in blood test results (1.67 × $10^3$/uL, norm: 1.80–7.70 × $10^3$/uL), low level of thyroid-stimulating hormone (TSH) (0.005 uIU/mL), and thyroid hormones free triiodothyronine (FT3) — 12.0 pmol/L; free thyroxine (FT4) — 21.4 pmol/L.

According to the consultant endocrinologist, the patient was treated with a thyrostatic (Thyrozol 20 mg 3 times per day) under the control of complete blood count, liver panel, and thyroid hormone concentrations.

On admission to the Endocrinology Department the patient was asymptomatic. She reported diaphoresis, heart palpitation, and hot flashes during previous chemotherapy.

Blood laboratory tests results revealed TSH suppression (0.005 uIU/mL) increased concentration of thyroid hormones (FT3 — 11.4 pmol/L; FT4 — 28.4 pmol/L), titer of antibodies to TSH receptors (TRAb) (0.3 U/L), thyroid peroxidase antibody (aTPO) (9.0 IU/mL), anti-thyroglobulin (aTG) (16.5 IU/mL) — all within the normal range, normocytic anaemia (red blood cells [RBC] — 3.58 × $10^6$/uL; haemoglobin [HGB] — 11.5 g/dL, mean corpuscular volume [MCV] — 93.6 fL), and neutrophils within the normal range (2.44 × $10^3$/uL).

The neck ultrasound showed nodular thyroid gland with heterogeneous echogenicity and a volume of approx. 22 mL. There was a normoechogenic nodule in the right lobe (12 × 8 × 20 mm). The lesion was verified in the fine-needle aspiration biopsy as benign (Bethesda II).

The treatment was modified and consisted of intravenous thyrostatic – Favistan 3 vials per day, sodium perchlorate, and oral steroids – methylprednisolone 8 mg 2 times per day. A gradual normalization of thyroid hormones was observed.

The patient was transferred to the Gynaecology Department. The surgical management was discussed with the tumour board. Considering the patient's medical history, suprapubic laparotomy, total hysterectomy, and bilateral salpingo-oophorectomy were performed.

The histopathological examination revealed a mature teratoma of the right ovary almost entirely built of thyroid tissue, and the diagnosis of struma ovarii was made.

After the surgery, the treatment was modified and consisted of Thyrozol 20 mg 2 times per day. Finally, when the concentration of thyroid hormones was stable within the reference range, the thyrostatic therapy was discontinued. Thyroid scintigraphy showed an enlarged thyroid gland, with homogenous uptake and no autonomous area. I-131 uptake after 24 hours was 26.6%.

Struma ovarii is a rare type of ovarian tumour that is most often asymptomatic but, as in the presented case, can cause hyperthyroidism and should be considered in the differential diagnosis of thyrotoxicosis. It can mimic malignant tumour or metastasis to the ovary.

Moreover, between 5% and 10% of all cases of struma ovarii can be malignant, with papillary thyroid carcinoma being the most common type [5].

In the presented case, the pelvic mass at the beginning was considered as a metastasis, and the hormonal disturbances as the result of iodine-induced hyperthyroidism, but in fact they were caused by hormonally active struma ovary.

Despite the rarity of the condition, it is important to remember the possibility of struma ovary in symptomatic and asymptomatic patients with ovary tumour.

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