Synchronous primary carcinomas
of the endometrium and ovary
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Clinical History:

A 73-year-old woman was referred for vaginal bleeding and anaemia (Hct: 32.5). Transvaginal sonography revealed a large partly cystic-solid left adnexal mass and a moderate amount of ascites.

Imaging Findings:

MDCT revealed a large multicystic pelvic mass, probably originating from the left adnexa, with contrast-enhancing solid components and thick, irregular walls or septa, of more than 3 mm thickness, demonstrating enhancement (Fig. 1), strongly suggestive of malignancy. A widened endometrial cavity was also detected (Fig. 1e). Pelvic MRI demonstrated the pelvic mass with solid parts, as areas of restricted diffusion, enhancing after gadolinium administration (Fig. 2). Endometrial carcinoma was detected on MRI, as a heterogeneous lesion, with restricted diffusion (Fig. 2). The tumour interrupted the junctional zone and invaded the myometrium in less than 50% (Fig. 2c). Both CT and MRI revealed the presence of ascites, thickening and enhancement of the peritoneum (Fig. 1d, 2e), a feature suggestive of peritoneal carcinomatosis. The patient underwent total abdominal hysterectomy with bilateral salpingo-oophorectomy and epiploectomy. Histology reported synchronous endometrioid adenocarcinomas of endometrium (FIGO IB) and both ovaries (FIGO IB), of moderate differentiation (Fig. 3).

Discussion:

Although synchronous multiple primary tumours are extremely rare, they usually involve the genitourinary and gastrointestinal tract, followed by both breast and genitourinary tract and breast and gastrointestinal tract [1]. Among gynaecologic malignancies, synchronous primary tumours of the endometrium and ovary are the most common. The incidence is reported as about 5% of patients with endometrial cancer and 10% of patients with ovarian cancer [2-4].
The pathogenesis of synchronous endometrial and ovarian carcinomas is unclear. The theory of “secondary Mullerian system” proposed that the epithelia of cervix, uterus, fallopian tubes, ovaries, and peritoneal surface share molecular receptors responding to carcinogenic stimulus, leading to the development of multiple primary malignancies synchronously. This hypothesis could provide explanation for synchronous malignancies of similar histology, but not in cases of dissimilar histology [2]. Various studies have reported that women with synchronous primary cancers of the endometrium and ovary have a better overall prognosis compared to those with a single-organ primary cancer and metastasis.

Simultaneous detection of malignancies of endometrium and ovary often challenges the clinicians and pathologists to make correct diagnosis and arrange appropriate management. These patients can be classified into three groups: primary endometrial cancer with ovarian metastasis, primary ovarian cancer with endometrial metastasis and synchronous primary endometrial and ovarian carcinoma. Several pathologic criteria have been proposed for distinguishing metastatic tumour from synchronous primary cancer, although this may remain challenging [1-5]. Among them, histologic dissimilarity of carcinomas, absence of vascular space invasion, ovarian tumour located in the parenchyma, without surface implants or other evidence of spread, endometrial cancer invading less than 50% of the myometrium, without evidence of spread, coexistence of atypical endometrial hyperplasia or ovarian endometriomas suggest the presence of synchronous primary carcinomas. In this patient, histologic diagnosis was based on absence of vascular space invasion, absence of any spread of ovarian malignancies and presence of endometriotic cysts.

**Imaging perspective**

Imaging findings that are strongly suggestive of ovarian malignancy include a mass partly cystic-solid, with solid parts as areas of restricted diffusion, enhancing after contrast administration, presence of necrosis within a solid tumour, cystic or solid-cystic lesions with thick and irregular walls or septa and/or with papillary projections, demonstrating contrast enhancement. Ancillary findings such as pelvic organ invasion, ascites, peritoneal metastases and adenopathy increase the diagnostic confidence of malignancy [6-11]. Ovarian carcinomas associated with endometrial hyperplasia or endometrial carcinoma include endometrioid carcinoma, granulosa cell tumour and rarely, fibroma or fibrothecoma [6-10].

**Background**

Although synchronous multiple primary tumours are extremely rare, they usually involve the genitourinary and gastrointestinal tract, followed by both breast and genitourinary tract and breast and gastrointestinal tract [1]. Among gynaecologic malignancies, synchronous primary tumours of the endometrium and ovary are the most common. The incidence is reported as about 5% of patients with endometrial cancer and 10% of patients with ovarian cancer [2-4]. The pathogenesis of synchronous endometrial and ovarian carcinomas is unclear. The theory of “secondary Mullerian system” proposed that the epithelia of cervix, uterus, fallopian tubes, ovaries, and peritoneal surface share molecular receptors responding to carcinogenic stimulus, leading to the development of multiple primary malignancies synchronously. This hypothesis could provide explanation for synchronous malignancies of similar histology, but not in cases of dissimilar histology [2]. Various studies have reported that women with synchronous primary cancers of the endometrium and ovary have a better overall prognosis compared to those with a single-organ primary cancer and metastasis.

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**Differential Diagnosis List:** Synchronous primary endometrioid adenocarcinomas of the ovary and endometrium., Endometrial polyp, Endometrial hyperplasia, Borderline ovarian tumour, Uterus leiomyoma, Intrauterine fluid collections, Including blood and/or necrotic material, Borderline ovarian tumour, Benign ovarian neoplasm, Metastatic ovarian tumour

**Final Diagnosis:** Synchronous primary endometrioid adenocarcinomas of the ovary and endometrium.

**References:**


Description: Transverse plain CT image demonstrates a large cystic-solid left adnexal mass (arrowheads) and a moderate amount of ascites (long arrow). Origin: Athina C.Tsili, Department of Clinical Radiology, University Hospital of Ioannina
Description: Axial contrast-enhanced (portal phase) multiplanar reformation displays complex multicystic pelvic mass, with soft-tissue elements and cystic parts with thick and irregular walls or septa and/or with papillary projections (arrowheads), all contrast-enhancing. Origin: Athina Tsili, Department of Clinical Radiology, University Hospital of Ioannina, Greece
Description: Coronal post-contrast CT reformation demonstrates pelvic mass. The dimensions of the tumour were 17x10 cm. Large adnexal masses are difficult to define if unilateral or bilateral in origin.

Origin: Athina Tsili, Department of Clinical Radiology, University Hospital of Ioannina, Greece
Description: Coronal post-contrast-medium CT reformatted image depicts peritoneal thickening and increased density of the peritoneal fat (arrowheads). CT findings were suggestive of peritoneal carcinomatosis, although this was not proved on pathology. Origin: Athina Tsili, Department of Clinical Radiology, University Hospital of Ioannina, Greece
Description: Sagittal post-contrast-medium reformation depicts endometrial thickening (long arrow). A small uterus leiomyomas (asterisk) and pelvic mass (arrow) are also seen. Origin: Athina Tsili, Department of Clinical Radiology, University Hospital of Ioannina, Greece
Description: Axial T1-weighted image depicts a multicystic pelvic mass, with parts of low signal intensity, similar to that of water and others hyperintense (arrowheads), suggestive of haemorrhagic content. Origin: Athina C. Tsili, Department of Clinical Radiology, University Hospital of Ioannina, Greece
Description: Coronal T2-weighted image reveals large multicystic pelvic mass, with solid mural components (asterisks), isointense when compared to normal myometrium. The endometrial cavity is expanded and heterogeneous (long arrow). Uterus leiomyoma (arrow). Origin: Athina C. Tsili, Department of Clinical Radiology, University Hospital of Ioannina, Greece
Description: Sagittal T2-weighted image depicts a distended endometrial cavity, with areas isointense to normal myometrium, suggestive of endometrial carcinoma. The tumour partly interrupts the junctional zone (arrow, FIGO stage IA). Uterus leiomyomas (asterisk). **Origin:** Athina C. Tsili, Department of Clinical Radiology, University Hospital of Ioannina, Greece
**Description:** Axial contrast-enhanced fat-suppressed T1–weighted image shows enhancement of the solid components of the pelvic mass (asterisk), a finding strongly suggestive of malignancy. Hyperintense parts (arrowheads) corresponded to haemorrhage pathologically. **Origin:** Athina C. Tsili, Department of Clinical Radiology, University Hospital of Ioannina, Greece
Description: Axial fat-suppressed post-contrast T1-weighted image shows the presence of ascites and peritoneal enhancement (arrowhead), suggestive of peritoneal dissemination. Imaging findings were not confirmed on pathology. Origin: Athina C. Tsili, Department of Clinical Radiology, University Hospital of Ioannina, Greece
Description: Sagittal dynamic contrast-enhanced image (early phase) displays endometrial carcinoma enhancing less than the normal myometrium (arrow). Uterus leiomyoma (asterisk). Origin: Athina C. Tsili, Department of Clinical Radiology, University Hospital of Ioannina, Greece
Description: Transverse ADC map (b?1000 s/mm2) at the level of adnexal tumour depicts restricted diffusion by the solid components, a finding confirming the diagnosis of malignancy (ADC value: 0.98 mm2/s, asterisk). Origin: Athina C. Tsili, Department of Clinical Radiology, University Hospital of Ioannina, Greece
Description: Transverse ADC map (b?1000 s/mm²) at the level of the endometrial lesion shows tumour hypointensity (ADC value: 0.85 mm²/s, arrow). Histology reported endometrioid adenocarcinoma, of moderate differentiation. Origin: Athina C. Tsili, Department of Clinical Radiology, University Hospital of Ioannina, Greece
Description: Endometrioid adenocarcinoma of the ovary. Foci of borderline tumour of endometrioid type were also recognised in the vicinity of the invasive tumour, (not shown in the figure). Origin: Anna Goussia, Department of Pathology, Ioannina, Greece
Description: Endometrioid adenocarcinoma that originates in the endometrium and extends into the myometrium. Origin: Anna Goussia, Department of Pathology, Ioannina, Greece