Ovarian metastasis from adenocarcinoma of the lung

A 38-year-old woman affected by an unresectable pulmonary adenocarcinoma, diagnosed 1 year earlier by bronchoscopy with biopsies and treated with platinum–pemetrexed-based chemotherapy, was referred to our center after the incidental finding of a left ovarian mass. On ultrasound examination a solid lesion, $46 \times 36 \times 29$ mm in size, was detected in the left ovary. The solid lesion appeared as a rounded lobulated mass, with a homogeneous echotexture with no stripes. Ovarian parenchyma adjacent to the mass (the so-called 'crescent sign') was clearly visible at the lateral part of the adnexum (size, $19 \times 20 \times 14$ mm) (Figure 1). On power Doppler examination, moderate vascularization was detected (color score, 3) within the ovarian lesion (Figure 2). The contralateral ovary was normal. No free fluid in the pouch of Douglas was detected. Serum tumor markers were: CA 125, 32 U/mL; CA 19.9, 52 U/mL.

The ultrasound examiner was uncertain as to the diagnosis. The first suggestion was ovarian fibroma, supported by the presence of a rounded solid lesion with an adjacent ovarian crescent sign, despite the fact that the absence of stripes meant that the echostructure was inconsistent with the typical ovarian fibroma appearance. A diagnosis of metastatic tumor was considered to be improbable because the examiner had never seen the crescent sign in the presence of an ovarian metastatic tumor. An open laparoscopy revealed that the uterus, Fallopian tubes and right ovary were normal, and confirmed the presence of a solid tumor adjacent to normal parenchyma in the left adnexal region. There were no signs of peritoneal carcinomatosis. The surgeon confirmed the suspicion of an ovarian fibroma and proceeded with enucleation of the solid ovarian lesion and its removal from the abdominal cavity through an endoscopic bag. There was no rupture of the tumor in the peritoneal cavity and ovarian parenchyma that appeared normal was left *in situ*. Final pathology revealed an ovarian metastasis from a poorly differentiated adenocarcinoma of the lung. The morphological diagnosis was confirmed by immunohistochemical staining, which was positive for keratin 7, thyroid transcription factor-1, cyclin-dependent kinase inhibitor 2A and tumor protein 53, and negative for vimentin, estrogen receptor, progesterone receptor, gross cystic disease fluid protein-15, cytokeratin 20 and CDX2 e WT1.

Pulmonary metastases to the ovaries are extremely rare. A few cases have been reported in the pathology literature, but only around 5% of women with lung cancer have ovarian metastases at autopsy[1]. They typically appear as uni/bilateral multinodular lesions, with widespread necrosis and extensive lymphovascular invasion; involvement of the ovarian surface is rare for adenocarcinoma of the lung, while for the small-cell carcinoma histotype, the ovarian parenchyma is usually obliterated[2].

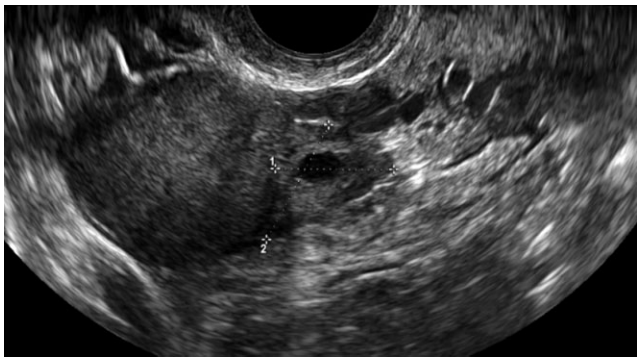

Figure 1 Gray-scale ultrasound image of ovarian metastasis from lung adenocarcinoma, showing a solid tumor with lobulated margins adjacent to normal ovarian parenchyma, the latter marked by calipers.

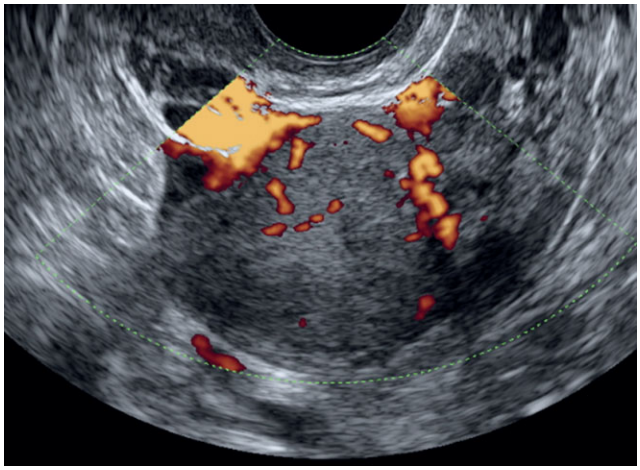

Figure 2 Power Doppler ultrasound image of ovarian metastasis from lung adenocarcinoma, showing moderate vascularization (color score, 3).

Preoperative diagnosis of pulmonary metastasis to the ovary is challenging and, to the best of our knowledge, no data have been reported in the literature regarding the sonographic appearance of this particular finding, whereas features of metastasis from the gastrointestinal tract, bile ducts, breast and lymphoma are relatively well documented. At ultrasound scan metastatic tumors usually appear as bilateral lesions, however the morphology may be different according to the primary tumor: those originating from the bowel, bile ducts or pancreas tend to be multilocular or multilocular solid, while those originating from the stomach (Krukenberg tumor), breast or lymphoma are solid in the majority of cases[3]. In an imaging-based paper by Testa *et al.*[3], the presence of the ovarian crescent sign in patients with metastases to the ovaries was not reported; indeed, this sonographic sign was described by Yazbek *et al.*[4] as a typical sign of non-invasive ovarian tumor. Zikan *et al.*[5] have only recently reported that the ovarian crescent sign can be associated with metastasis, and in their series normal ovarian parenchyma was detected in all cases of ovarian metastasis originating from breast and

lymphoma. However, in their selected population there were no cases of ovarian metastases from lung carcinoma.

This case is an example of an ovarian metastasis originating from a lung adenocarcinoma which, on ultrasound examination, appeared as a solid ovarian mass, with lobulated margins and moderate vascularization, and was adjacent to normal ovarian parenchyma. These findings could prompt an erroneous diagnosis of benign ovarian tumor.

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