Acta Radiologica Open
10(2) 1–3

DOI: 10.1177/2058460121990293
journals.sagepub.com/home/arr
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CT and MR imaging findings of bilateral ovarian metastasis from renal cell carcinoma: a case report

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Abstract

Secondary ovarian involvement by renal cell carcinoma rarely occurs. Here, we describe the computed tomography and magnetic resonance imaging findings of bilateral ovarian metastases from renal cell carcinoma that demonstrated heterogeneous strong contrast enhancing tumors with flow voids around and within the tumors. In addition, the apparent diffusion coefficients of the malignant tumors were high. These findings were similar to those of renal cell carcinomas at primary and other metastatic sites.

Keywords

Magnetic resonance imaging, computed tomography, ovarian, metastasis, renal cell carcinoma

Received 14 December 2020; accepted 7 January 2021

Introduction

The ovary is a common metastatic site, consisting of up to 15% of ovarian neoplasms. The common primary sites of ovarian metastases are the colon, stomach, and breast. Secondary ovarian involvement by renal cell carcinoma (RCC) rarely occurs. Herein, we demonstrate computed tomography (CT) and magnetic resonance (MR) imaging findings of a bilateral ovarian metastasis from RCC.

Case report

The patient was a 58-year-old woman who complained of abdominal distension and visited a nearby hospital. Bilateral ovarian tumors with ascites were identified, and she was referred to our hospital for further examination. Her past history included a postoperative right RCC (clear cell carcinoma) eight years ago, and her CA 125 level was elevated to 1720 U/mL.

MR imaging revealed bilateral ovarian tumors that exhibited iso to slightly low intensity on T1-weighted images (WI), high intensity on T2WI, and mild high intensity on diffusion-weighted images (DWI), with *b* value of 1000. On T2WI, tortuous and dotted flow voids were observed around and within the tumors (Fig. 1). The apparent diffusion coefficient (ADC) value was $2.33 \times 10^{-3}\,mm^2/s$ in the right ovarian tumor and $2.39 \times 10^{-3}\,mm^2/s$ in the left tumor, respectively. On contrast-enhanced CT, the bilateral ovarian tumors showed heterogeneous strong contrast enhancement (Fig. 1). Ascites was also found. Bilateral adrenal metastases were also observed. Preoperatively, she was diagnosed with bilateral ovarian metastasis and adrenal metastasis from RCC.

A bilateral salpingo-oophorectomy was performed. Massive ascites was observed, but there was no evidence of peritoneal dissemination. On gross examination, the masses were heterogeneous, yellowish, and solid with hemorrhages, necrosis, and pushing margins.

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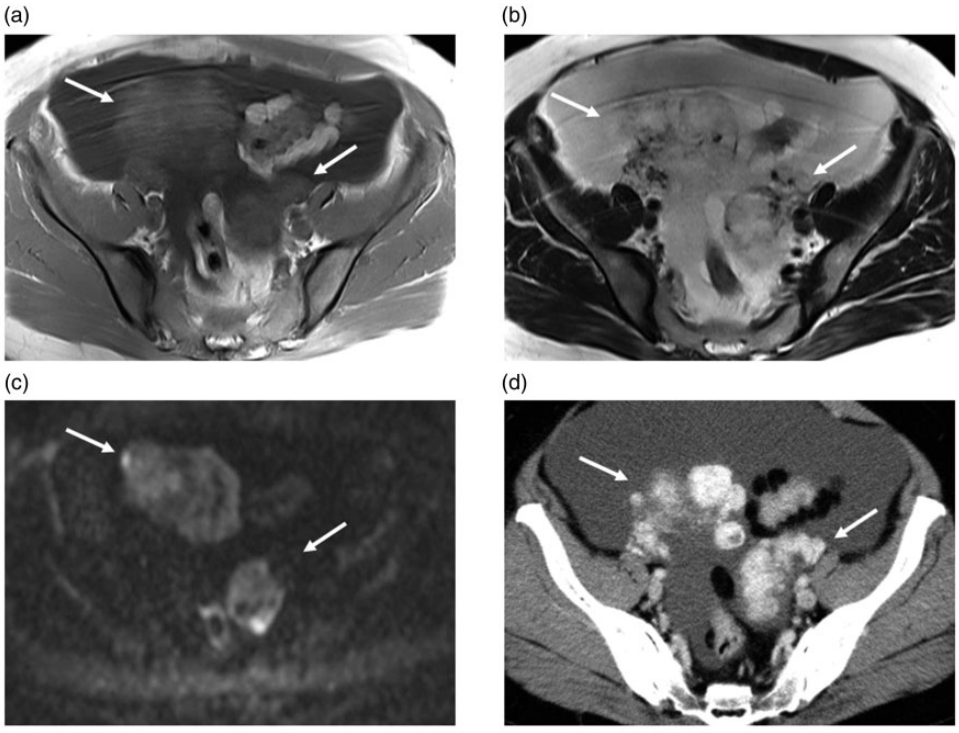

Fig. 1. Bilateral ovarian tumors (arrows) show iso to slightly low intensity on T1WI (a), high intensity on T2WI (b), and mild high intensity on diffusion-weighted imaging (c). On T2WI, tortuous and dotted flow voids are observed around and within the tumors (a). They show heterogeneous strong contrast enhancement on contrast enhanced CT (d).

Microscopically, the tumors were composed of nests of epithelial cells with abundant clear cytoplasm, which was interspersed with capillary growth (Fig. 2). These masses were pathologically diagnosed as ovarian metastases from RCC. After the operation ascites disappeared.

Discussion

Ovarian metastasis from RCC is very rare, and most of these cases are reported in a case report. According to a review of 41 cases,[1] most were composed of clear cell type RCC. In this report, ovarian metastases were observed on the ipsilateral side of the primary site in 13 cases, contralateral in 15, and bilateral in 11 cases.[1] Although ovarian metastasis is considered to occur via retrograde renal venous spread into the ovaries, other routes might be possible, from the view point of the high frequency of the contralateral and bilateral sides.[1]

Ovarian metastases are detected three months to 21 years after initial kidney involvement.[1] In the present case, ovarian metastasis occurred eight years after nephrectomy, which is considered late recurrence. The rates of late RCC recurrences after five years have been reported to range from 4.3% to 20%.[2,3] The typical sites of late recurrence are distant, including the

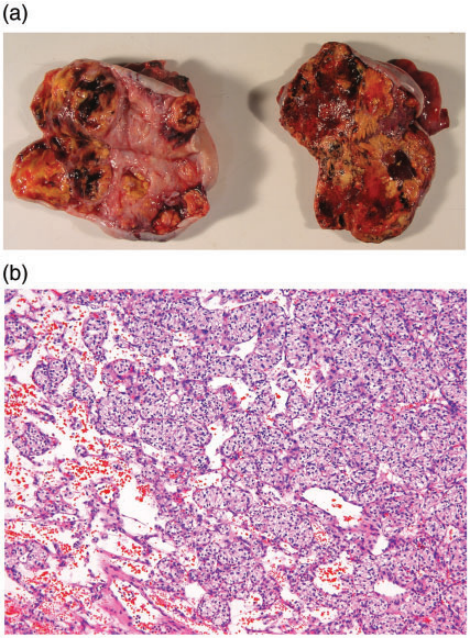

Fig. 2. The masses are heterogeneous, yellowish, and solid with hemorrhages, necrosis, and smooth margins (a). Hematoxylin and eosin (H&E) stain (high-power field) section shows nests of epithelial cells with abundant clear cytoplasm, interspersed capillary growth (b).

lungs, pancreas, bone, brain, and adrenal glands.[2,3] Thus, ovarian metastases from RCC are quite rare.

Imaging findings of ovarian metastasis from RCC are quite limited due to its rarity. Snyder et al. reported that ovarian metastasis that showed complex solid and cystic tumors on enhanced CT.[4] Similarly, the present case showed heterogeneous strong contrast enhancement on contrast enhanced CT. To the best of our knowledge, MR imaging findings have not been reported. In the present case, ovarian metastases showed high intensity with some flow voids on T2WI. Brain and bone metastases from RCC have shown intratumoral and marginal flow voids, reflecting its hypervascularity.[5–7] Ovarian metastases also demonstrated the same findings.

Regarding ADC values, the lesions showed high values despite being malignant tumors. According to a meta-analysis,[8] clear cell type RCC shows high mean ADC values ($1.86 \times 10^{-3}\,mm^2/s$) compared to other subtypes of RCCs. Although the detailed mechanism underlying the high ADC values has not been clarified, the different perfusion in this RCCs subtype could partially explain the difference in ADC values.[9]

Differential diagnoses include hypervascular tumors, such as sclerosing stromal tumor (SST), granulosa cell tumor, and yolk sac tumor. SST is a rare, benign ovarian tumor that occurs in the second or third decade of life. The tumor demonstrates marked early enhancement in the solid components on dynamic MR imaging. However, it is usually unilateral and consists of cystic components with high intensity and solid components with intermediate-high intensity on T2WI.[10] Granulosa cell tumors are divided into adult and juvenile types, most of which are of the adult type, which occurs more often in middle-aged and postmenopausal women. The tumor is usually unilateral and shows a solid mass with various amounts of cystic components and hemorrhages.[11] Yolk sac tumors are unilateral and occur primarily in children and young women. Serum alpha-fetoprotein is a useful diagnostic marker, and the tumors show intratumoral flow voids, and are predominantly solid with extensive areas of hemorrhages, necrosis, and cystic degeneration.[12]

In conclusion, we described a case of a bilateral ovarian metastasis from RCC about CT and MR imaging findings, which demonstrated heterogeneous strong contrast enhancing tumors with flow voids around and within the tumors. In addition, the ADC values of the tumors were high, despite their malignant nature. These findings were similar to those reported for RCC at primary and other metastatic sites.

Acknowledgement

The authors thank Hiroaki Komatsu, Shinya Sato, Tetsuro Oishi, for their help in the tumor board.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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