

Tumor to tumor metastasis: Primary renal carcinoid tumor with metastasis of invasive ductal carcinoma of the breast

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Accepted for publication on 14 June 2005

Background: Tumor to tumor metastases are uncommon and primary carcinoid tumor of the kidney is a very rare neoplasm.

Case: In this report, breast carcinoma metastasizing to a primary renal carcinoid tumor is discussed.

Conclusion: This is the first reported case with such a combination of recipient and donor tumors. The possibility of tumor to tumor metastases should always be considered when any tumor presents with a dimorphic appearance and an unusual pattern.

Key words: Carcinoid tumor, kidney, recipient tumor, donor tumor

Introduction

Primary renal carcinoid tumor is rare. Less than 40 cases were reported previously to our knowledge.¹ Despite the relatively high incidence of multiple synchronous neoplasms, metastases of a cancer to another coexisting tumor are extremely rare. About 150 cases of tumor-to-tumor metastases have been previously published.^{2,3,4} Renal cell carcinoma (RCC) is the most common recipient tumor followed by sarcomas and lung carcinoma is the most common donor tumor followed by breast carcinoma.^{2,5,6–9} We report a case of primary renal carcinoid tumor with metastasis of invasive ductal carcinoma of the breast. This is the first reported case with such combination of recipient and donor tumor

Clinical summary

A 44-year-old woman was admitted to the hospital in March 2002 with right flank pain, nausea, vomiting and weight loss. Physical examination revealed a mass in the right flank. Abdominal ultrasonography showed a 13x5,5 cm solid mass in the lower pole of the right kidney with multiple metastatic lesions in the liver.

The clinical diagnosis was renal cell carcinoma and right radical nephrectomy was done. At laparotomy multiple lesions in the liver were confirmed and numerous biopsies were taken. In postoperative period, the patient was seen in medical oncology department. Physical examination revealed a left breast mass as well as left axillary and supraclavicular lymphadenopathies. The breast mass was about 5 cm at largest diameter on palpation and skin fixation was seen. Incisional biopsy was obtained.

Pathological findings

On macroscopy, the lower pole of the kidney was replaced by a tumor that was sharply demarcated from the renal parenchyma and measuring 15x10x8 cm. The cut surface was yellowish-white in color with areas of hemorrhagic necrosis. The renal capsule and renal vein were intact.

Microscopically, the tumor was demarcated from the surrounding renal parenchyma. The tumor cells formed ribbons and solid nests with peripheral palisading (Figure 1). The neoplastic cells were round or polygonal and had a scant eosinophilic cytoplasm.

The nuclei were round to oval with evenly dispersed coarsely granular chromatin. Focal anaplasia and necrosis were present. Mitotic activity was 2-3 mitosis per 10 high power fields. Immunohistochemical analysis showed diffuse staining for pancytokeratin (Neomarkers; 1:600), low molecular weight cytokeratin (Neomarkers; 1:100), neuron specific enolase (Neomarkers; 1:4000) (Figure 2), and synaptophysin (Neomarkers; prediluted) (Figure 3), as well as focal staining for vimentin (Neomarkers; 1:300). Stains were negative for chromogranin (Neomarkers; prediluted), and high molecular weight cytokeratin (Neomarkers; 1:100). However, in some sections of the tumor, a different growth pattern was recognized. In these areas the tumor cells were larger with abundant eosinophilic cytoplasm. The nuclei were oval to round and contained one or two prominent nucleoli. Tumor cells formed solid nests and tubular structures (Figure 4). The diagnosis was carcinoid tumor. The liver biopsy also showed carcinoid tumor metastasis.

The biopsy from the left breast lesion was diagnosed as invasive ductal carcinoma with infiltration of the breast skin. Histological features of the breast carcinoma were identical with the appearance of the different growth pattern in the kidney tumor. New samples taken from the kidney tumor showed the intimate admixture and highlighted the contrasting histologic appearance of the two separate neoplasms. Immunohistochemically the cells of the second tumor were strongly positive for GCDFP15 (Neomarkers; prediluted) (Figure 5), estrogen receptor Ab-14 (Neomarkers, 1:200) and progesterone receptor Ab-8 (Neomarkers, 1:200) (Figure 6). In conclusion, our diagnosis was renal carcinoid tumor with metastasis of invasive ductal carcinoma of the breast.

Bone scan revealed multiple bone metastases which had not been histologically examined. Mastectomy was not performed because of distant metastasis. The patient received chemotherapy for breast carcinoma and palliative radiotherapy was performed for bone metastasis. One year later control abdominal ultrasonography revealed a left adnexial mass. Total abdominal hysterectomy and bilateral salphingo-oophorectomy were done. Histopathological

examination showed metastasis of breast carcinoma to ovaries. The patient received chemotherapy and hormone therapy. The patient is still alive.

Discussion

Despite the numerous reports of the coincidental occurrence of multiple primary neoplasms in the same person, the documented cases of metastasis of one tumor to another are rare. Tumor to tumor metastases are uncommon, less than 50 cases have been reported in which recipient tumor may be also malignant.⁵ Followed by sarcoma, renal cell carcinoma is the most common malignant recipient tumor. Among the donor tumors, lung cancer is the most frequent primary, followed by breast, prostate and thyroid carcinomas.^{2,5-7}

Although common in respiratory and gastrointestinal organs, carcinoid is rarely encountered in the urogenital system.¹⁰ Primary carcinoid tumor of the kidney is a very rare neoplasm. In the literature less than 40 cases have been reported to date.^{1,11} We report a new case of primary renal carcinoid tumor metastasized from invasive ductal carcinoma of the breast. The histogenesis of the renal carcinoid is unclear. As no intrinsic neuroendocrine cell has been identified so far within the normal kidney, many theories have been postulated to explain its occurrence. The most popular theory is that these tumors arise from a primitive cell line which then differentiates in the neuroendocrine direction.¹⁰ Owing to the rarity of this entity, the diagnosis of carcinoid tumor of the kidney is often considered only after biopsy and must be distinguished from renal cell carcinoma (RCC) which is the most common malign tumor arising from the kidney. Immunohistochemically, carcinoid tumors stain positive for chromogranin, synaptophysin and neuron specific enolase, which serve to distinguish these tumors from renal cell carcinoma.^{1,10,12} Positive staining for synaptophysin and neuron specific enolase were seen in our case, but chromogranin was negative. In the literature, irregular patchy staining or negative immunoreaction for chromogranin was reported in atypical carcinoids.¹³

Documentation of tumor-to-tumor metastasis must meet certain criteria. According to Campbell et al.¹⁴ these criteria are the following: 1) The existence

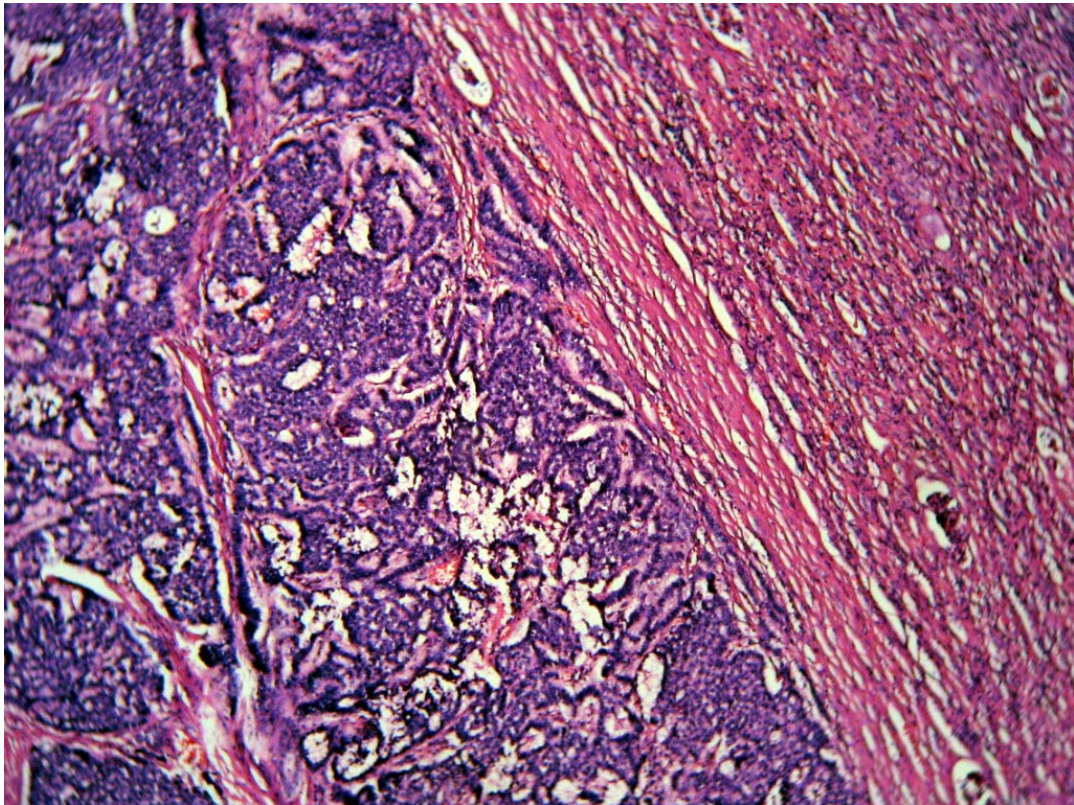


Figure 1. Histologic appearance of the renal carcinoid tumor. The tumor was well demarcated from the surrounding renal parenchyma.

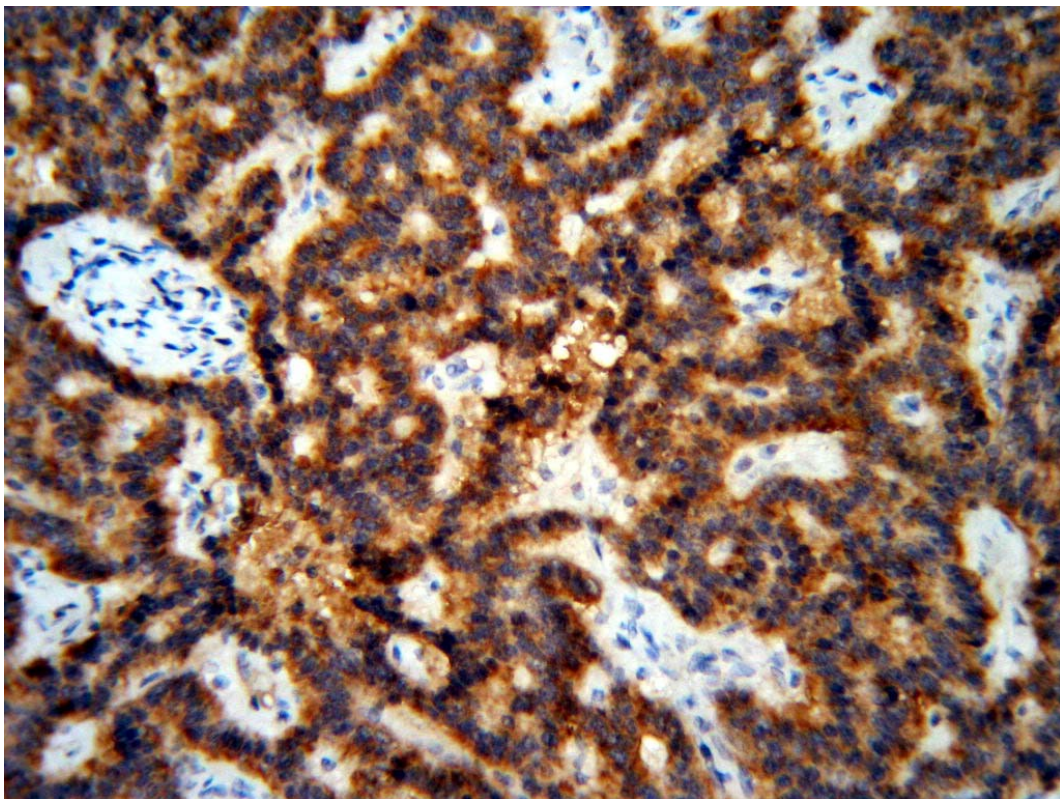


Figure 2. Immunostaining for NSE in renal carcinoid tumor.

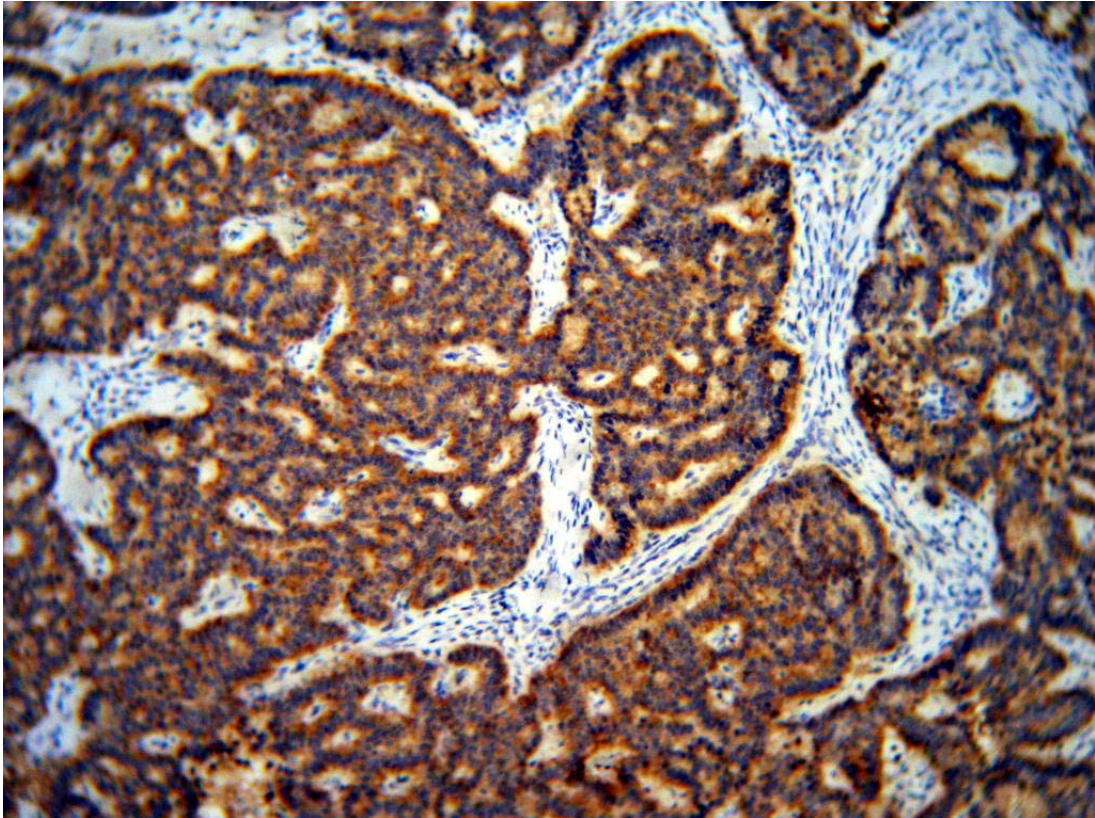


Figure 3. Figure 3: Immunostaining for synaptophysin in renal carcinoid tumor.

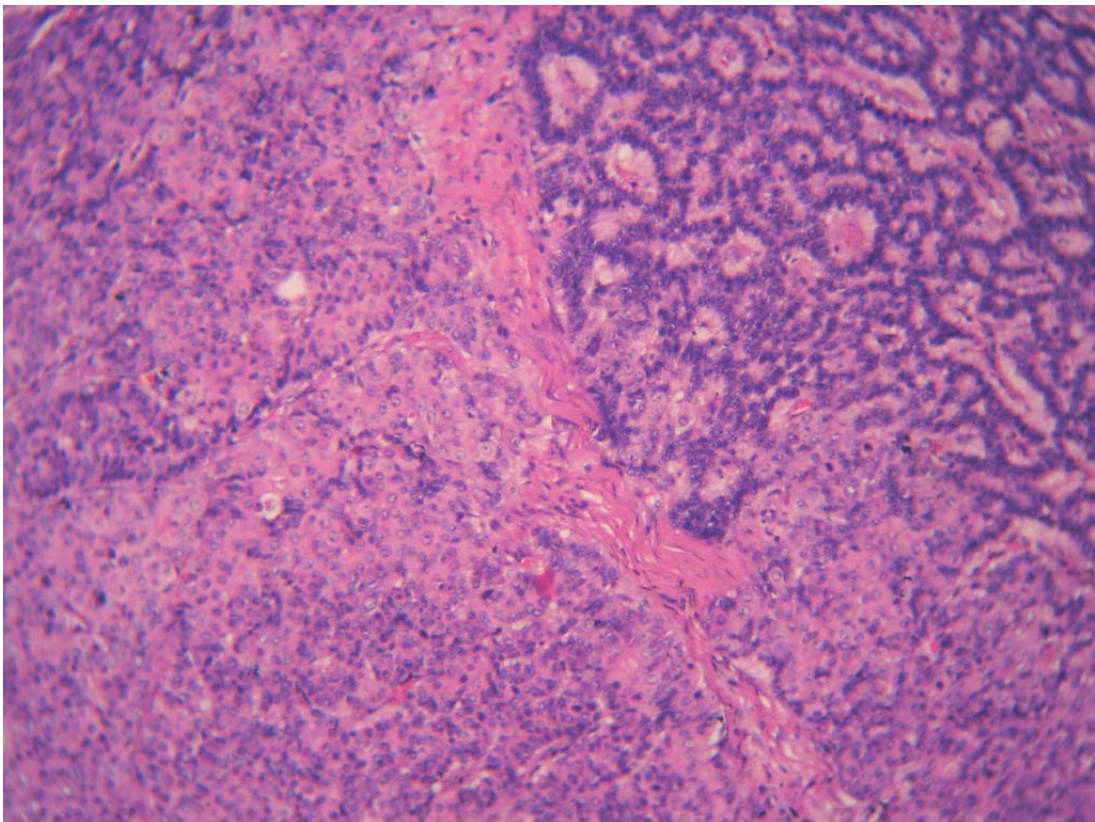


Figure 4. Light microscopic study showed a tumor containing biphasic growth pattern. Smaller carcinoid tumor cells with scant cytoplasm were seen at right and larger cells with abundant eosinophilic cytoplasm, larger nuclei, and prominent nucleoli were seen at left.

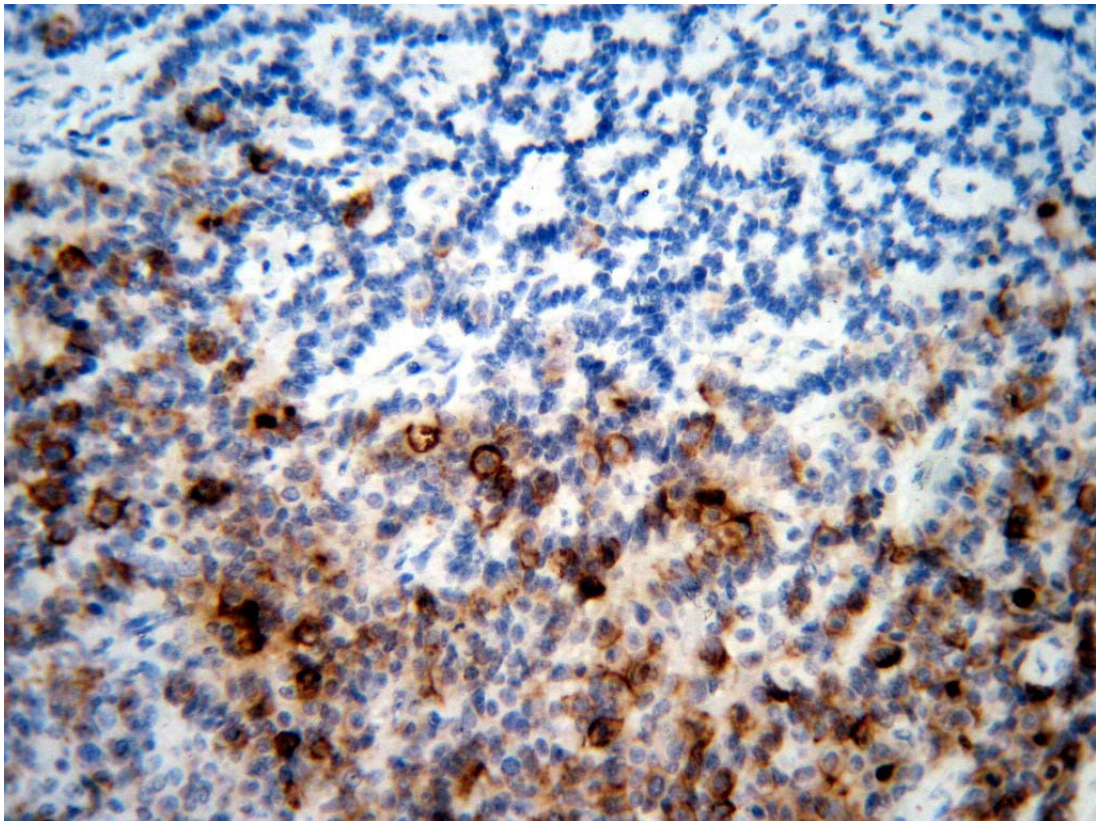


Figure 5. GCDFP15 immunostaining demonstrated strong immunoreactivity in the larger cells, but not in carcinoid tumor cells.

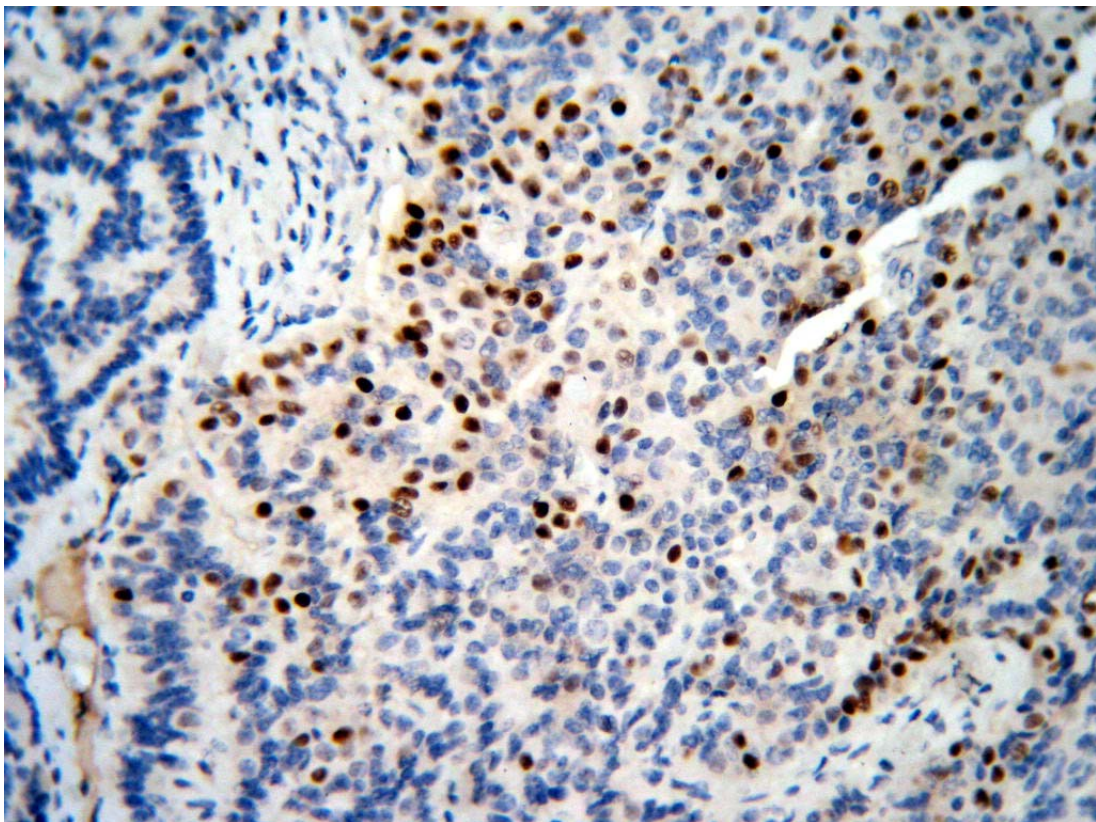


Figure 6. Progesteron receptor immunostaining demonstrated strong immunoreactivity in the larger cells, but not in carcinoid tumor cells.

of more than one primary tumor must be proven. 2) The recipient tumor must be a true benign or malignant neoplasm. 3) The metastatic neoplasm must be a true metastasis with established growth in the host tumor, not the result of contiguous growth or embolization of tumor cells, and 4) It should not pertain to tumors that have metastasized to lymphatic systems that are already the site of malignant disease. Our present case meets these criteria.

Pathogenetically, metastasis is a complex multistep process under genetic control, in which several genes are involved. Several properties of the host, such as its anatomical place, its vascularity and the local potential for immune reaction against the metastasizing cells, may also play a significant role.²

RCC has been the most common recipient tumor. Because 25 per cent of the minute volume flow passes through the kidneys and RCC tends to be highly vascular, RCC is more likely to receive a large proportion of the emboli shed by donor tumors.⁷ Rich vascularity of carcinoid tumor may have been the major factor that led to implantation and growth of the metastatic tumor. To our knowledge, although carcinoid tumor of the small intestine have been reported as a recipient site in the literature¹⁵ there have been no reports in which carcinoid tumor of the kidney is the recipient. In conclusion, tumor-to-tumor metastases are rare, the possibility should be always considered when any tumor presents with a dimorphic appearance and an unusual pattern.

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