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Renal Metachronous Metastasis from Adenocarcinoma of the Rectum: A Case Report and Review

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Authors' contributions

This work was carried out in collaboration among all authors. Author DH contributed to writing the paper including acquisition and analysis of data. Authors HY and SO contributed to acquisition of data. Author YK contributed to carry out the pathologic confirmation. Author NO analyzed and reviewed the image and case descriptions. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

Aim: Colorectal cancer metastasis to the kidney is extremely rare and the diagnosis of metastatic kidney tumor is challenging due to occasionally mimic primary renal tumors in imaging studies. We present a case of rectal cancer metastasis to the kidney and review the relevant literatures.

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Present of Case: A 51-year-old man was referred to our department due to a left renal tumor with size of approximately 3 cm in diameter detected by computed tomography (CT) during the follow-up after high anterior resection of the rectum for a rectal cancer and postoperative chemotherapy 5 years ago. Three years later after the initial treatments he had a metastasis in the left lung and underwent partial resection of the left lower lobe of the lung. Percutaneous renal tumor biopsies were conducted due to atypical renal tumor on the imaging diagnosis, and resulted in histologically tubular adenocarcinoma, representing rectal cancer metastasis. The imaging diagnosis showed no other metastasis. Therefore, he underwent left laparoscopic nephrectomy without any complications. Unfortunately, he had metastases of the lungs and died of cancer progression 19 months after the nephrectomy.

Conclusions: There is the possibility of metastatic tumor to the kidney in patients with colorectal cancer when renal mass is found during routine follow-up. The prognosis seems to be poor in even undergoing surgical treatment such as nephrectomy like our case.

Keywords: Renal metastasis; colorectal cancer; rectum; adenocarcinoma.

1. INTRODUCTION

Although the frequency of metastasis to the kidney in patients with cancer is 7.2% in a large autopsy series [1], incidental discovery of a renal metastasis is a much rarer in clinical practice. The most common primary tumors are lung, breast, digestive organs such as esophagus, stomach and colon, and melanoma [2]. Recently, improvements of oncological treatment and results in long follow-up were associated with an increase of number of reported kidney metastasis [3]. However, metastatic kidney tumors occasionally mimic primary renal tumors in clinical symptoms and imaging studies [4]. Therefore, to determine the diagnosis and treatment of metastatic tumors to the kidney is challenging. Recently, we experienced a case of rectal cancer metastasis to the kidney. Here, we present it and also review the relevant literatures.

2. PRESENTATION OF CASE

A 51-year-old man was referred to the department of urology in the Higashimatsuyama Municipal Hospital due to a left renal tumor with size of approximately 3cm in diameter detected by computed tomography (CT) from the department of surgery during the follow-up after high anterior resection of the rectum for a rectal cancer (pT4a, moderately differentiated tubular adenocarcinoma) and 12 cycles of postoperative chemotherapy with FOLFOX (fluorouracil, leucovorin and oxaliplatin) 5 years ago. Three years later after the initial treatments he had a metastasis in the left lung and underwent partial resection of the left lower lobe of the lung and 2 cycles postoperative chemotherapy with CAPOX (capecitabine and oxaliplatin). Serum carcinoembryonic antigen (CEA) value was elevated to 16.2 ng/ml (normal range<5.0 ng/ml) but the levels of other tumor markers such as carbohydrate antigen 19-9 (CA19-9) and α-fetoprotein (AFP) were normal at the referring to the department of urology.

Abdominal ultrasound revealed mildly hypoechoic lesion in the lower pole of the left kidney (Fig. 1A). Contrast-enhanced CT scan showed diffusely infiltrate mass with relatively less enhancement as compared to background renal parenchyma in the lower pole of the left kidney and the possibility of extending to lower renal calix (Fig. 1B). Magnetic resonance imaging (MRI) demonstrated relatively heterogenous hypointense (Fig. 1C) on T1-weighted images (T1W1) and increase of signal intensity (Fig. 1D) on diffusion-weighted imaging (DWI) in the lower pole of the left kidney. These imaging findings revealed atypical renal tumor. Therefore, percutaneous renal tumor biopsies were conducted, which showed tubular adenocarcinoma (Fig. 2A). Immunohisto-chemically, caudal type homeobox 2 (CDX-2) was positive (Fig. 2B) while thyroid transcription factor-1 (TTF-1) was negative (Fig. 2C). From these findings the left kidney tumor was diagnosed with metastasis of the rectal cancer resected 5 years ago. The imaging diagnosis indicated no other metastasis.

The patient underwent left laparoscopic nephrectomy without any complications. The resected specimen involved 3 x 2cm solid, grayish-white tumor in the lower pole of the left kidney (Fig. 2D), and histologically confirmed metastasis of the rectal cancer. However, cancer relapse occurred on the bilateral lungs 3 months after the surgical intervention. Although systematic chemotherapy with FOLFIRI+BV (bevacizumab, irinotecan, fluorouracil, calcium levofolinate hydrate) was given, he unfortunately died of cancer progression 19 months after the nephrectomy.

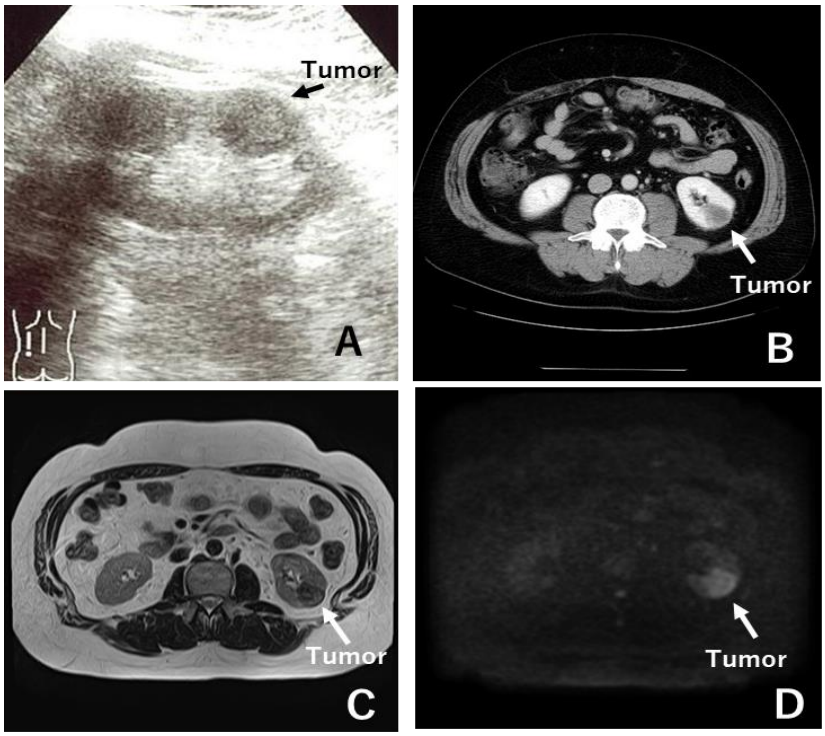

Fig. 1. Imaging findings. Ultrasound shows mildly hypoechoic lesion in the lower pole of the left kidney (A), contrast-enhanced CT scan reveals diffusely infiltrate mass with relatively less enhancement as compared to background renal parenchyma (B), and MRI shows relatively heterogenous hypointense on T1-weighted images (C) and increase of signal intensity on diffusion-weighted imaging (D). Arrows show tumor

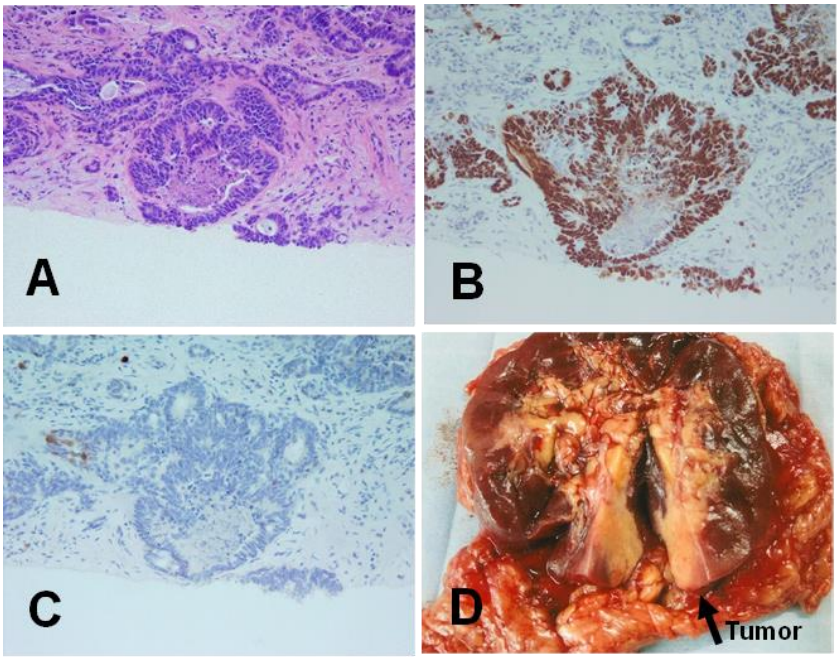

Fig. 2. Hematoxylin and eosin stain in the biopsy specimens shows tubular adenocarcinoma (A). Immunohistochemical staining reveals positive CDX-2 (B) and negative TTF-1 (C) in the biopsy specimens. Gross appearance of the resected specimen reveals a 3 x 2cm solid, grayish-white tumor (allow) in the lower pole of the left kidney (D)

Table 1. Reports of metastatic colorectal cancer to the kidney since 2000

Aurhor (year)	Age	Sex	Primary Site	Interval between Primary Tumor and Kidney Metastasis (month)	Tumor Site in Kidney	Tumor Size in Kidney Metastasis (cm)	CT Findings in Kidney Metastasis	Treatment	Prognosis after Kidney Metastasis (Month)
Aksu G et al. (2003) [5]	72	M	Decending colon	simultaneous	Rt	2.5x2.0	Not precise finding	Nephrectomy+Chemo	9Ms died
Julianov A et al.(2004) [6]	63	M	Sigmoid	60	Rt	NA	hydronephrosis	Nephrectomy	12Ms alive with progression
Waleczek H et al. (2005) [7]	77	F	Accending colon	36	Lt	2.5	Not precise finding	Partial nephrectomy	NA
Ho L et al. (2009) [8]	84	F	Cecum	NA	Rt	NA	Hypermetabolic soft tissue mass in PET-CT	Partial nephrectomy	NA
Yamaguchi K et al. (2011) [9]	53	F	Rectum	7	Lt	2.5	Hypoenhanced, unclear margin	Nephrectomy	46Ms disease-free alive
Dagnoni C et al. (2011) [10]	75	M	Sigmoid	7	Lt	4.2x3.9	Heterogenous	Diagnosis with biopsy Chemo	Progression
Klaassen Z et al. (2013) [11]	55	F	Decending colon	96	Bilateral	Rt:4.3, Lt:6.0	Hypoenhanced, unclear margin	Lt nephrectomy+Chemo	Progression
Maruyama T et al. (2013) [12]	65	F	Accending colon	47	Rt	4.5x4.0	Hypovascular with calcification	Nephrectomy	8Ms died
Dulskas A et al. (2015) [13]	42	M	Sigmoid	48	Lt	8.1 x6.6	Hypoenhanced, unclear margin	Nephrectomy	18Ms disease-free alive
Andrade DC et al. (2019) [14]	76	M	Colon	48	Lt	NA	Hypoenhanced , unclear margin	Nephrectomy	NA
Rosati G et al. (2021) [15]	56	M	Rectum	33	Lt	2.3	Hypoenhanced, unclear margin	Diagnosis with biopsy Chemo	29Ms died
Present case	51	M	Rectum	67	Lt	3.0x2.0	Hypoenhanced, unclear margin	Nephrectomy+Chemo	19Ms died

NA: Not Available *Lt: Left, Rt: Right* *Chemo: Chemotherapy* *Ms: Months*

3. DISCUSSION

The most frequent metastasizing sites from colorectal cancers are the liver, lungs, local and/or regional retroperitoneal, and peripheral lymph nodes. However, metastasis of colorectal cancer in the kidney is considered to be clinically rare, only 2.8% in even postmortem analyses [1]. We performed a literature search of the case reports on metastasis to the kidney from colorectal cancer since 2000. Table 1 shows identified cases [5-15] including our case. The mean age and standard deviation (SD) at diagnosis of metastasis to the kidney was 64±13 years old, while the mean interval and SD between diagnosis of colorectal cancer and metastasis to the kidney was 41±29 months. The primary cancers located in the sigmoid or rectum metastasized to the left kidney except for one case. The mean metastatic kidney tumor size and SD was 4.0±0.6cm in diameter.

The exact mechanism of metastasis to the kidney is not precisely known. However, Cazacu et al. [16] suggested that the most common cancers metastasis to the kidney are originated from the lung. The lung tumors detach from the primary site enter to the arterial circulation and reach directly to the kidney. Other mechanisms may involve multiple step metastasis when tumor cells disseminate to the kidney after directly invade or through metastasis to other organs. In this case the lung metastasis was first found, followed by renal metastasis.

The definitive diagnosis of metastasis to the kidney from other organ cancers is often hard to differentiate from renal cell carcinomas based on imaging diagnosis. However, there are several features on imaging findings in tumors of metastasis to the kidney. In ultrasonography the tumors tend to appear as homogenous hypoechoic masses without capsule, sometimes wedge-shape or diffuse renal infiltration, and are often multiple or bilateral [17], while on contrast-enhanced CT the tumors typically present as a solid and homogenously-enhancing endophytic renal mass [18]. According to the review of the reported cases including our case, the characteristics of CT were identified hypoenhanced and unclear margin of tumors. However, although the primary cancer is already known diagnosed at the same time or previously, as to especially isolated tumor, it is difficult to discriminate from papillary renal cell carcinoma and chromophobe cell carcinoma, which are not most common renal cell carcinoma with reveal hypovascular features on contrast-enhanced CT [19]. On MRI the characteristics in the tumors of metastasis to the kidney are generally hypointense compared to background renal parenchyma on T1-weighted images while heterogeneously hyperintense on T2-weighted images [17]. However, to definite the diagnosis histological examination is required by puncture biopsy or surgical resection.

The treatment of metastasis to the kidney from primary cancers is indefinite. Surgical treatments such as nephrectomy or partial nephrectomy provide an opportunity of curative option for patients without metastasis at other sites, and the tumor reduction surgery may provide a potential delay of further chemotherapy in even multiple metastases in other organs. In this case nephrectomy was performed due to the possibility of renal calix invasion and unclear border between the tumor and renal parenchyma on the imaging diagnosis. Regarding the treatment of metastatic renal tumor in this literature search of the reported cases including our case nephrectomy alone or in combination with chemotherapy, partial nephrectomy and chemotherapy alone were identified 8 cases (66%), 2 cases (17%) and 2 cases (17%), respectively. As to the prognosis after the treatment of kidney metastasis only 2 cases (17%) who underwent nephrectomy were identified disease-free survival with the longest follow-up of 46 months, while the remained cases revealed progression or death within 29 months. Survival was improved in some patients with only kidney metastasis who underwent renal surgical intervention. However, the most cases were poor prognosis.

4. CONCLUSIONS

Metastasis to the kidney from colorectal cancer is clinically not common. However, there is the possibility of metastatic tumor to the kidney in patient with colorectal cancer when a renal mass is found during routine follow-up. The prognosis in patients with previously metastases except for the kidney, who are even received curative therapies before the detection of metastatic kidney tumor, seems to be poor in even undergoing surgical treatment such as nephrectomy like our case.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Authors hereby declare that NO generative AI technologies such as Large Language Models

(ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

CONSENT

Informed written consent was obtained from the patient and his family for publication of this case report.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interest exist.

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