Renal cell carcinoma and peritoneal metastases - a rare case evaluated with MDCT
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Authors: Giannakis P1, Tsili AC1, Mpaltogiannis D2, Silakos A2, Sofikitis N2, Tsampoulas K1.1) Department of Clinical Radiology; 2) Department of Urology; University Hospital of Ioannina, Greece.

Patient: 64 years, male

Clinical History:

We report an unusual case of renal cell carcinoma (RCC) with peritoneal metastases at the time of diagnosis, evaluated with multidetector CT.

Imaging Findings:

A 64 year old man was admitted to the urology department for painless macroscopic hematuria. The patient reported fatigue, anorexia, and weight loss of 3 months duration. Laboratory data analysis showed anaemia. Abdominal sonography revealed a large, heterogeneous right renal mass, highly suspicious for malignancy and the presence of ascites. Multidetector CT examination of the abdomen was followed. The presence of right renal cell carcinoma was confirmed, detected as a heterogeneous mass on plain images (Fig 1), with strong, inhomogeneous, mainly peripheral enhancement (Fig 2). Hypodense parts within the mass, not enhancing after contrast material administration were attributed to the presence of haemorrhage or necrosis. The dimensions of the tumour were 92x86x69 mm. There was stranding and multiple contrast-enhancing nodules in the perinephric fat, indicating tumoural spread (Fig 1,2). A moderate amount of ascites and innumerable heterogeneously enhancing peritoneal implants (Fig 1,2) were detected, suggestive for the presence of peritoneal metastases. The right renal vein and the inferior vena cava were patent. No retroperitoneal lymphadenopathy was seen. Hypervascular lung metastases were also recognized (Fig 3).

A CT-guided biopsy of the renal mass and the peritoneal implants was performed and the pathologic examination was consistent with low-grade, renal cell carcinoma (RCC) of clear cell type, with peritoneal metastases.

The patient was subsequently referred to the Oncology department, but he was lost to follow-up.

Discussion:

Renal cell carcinoma (RCC) is the most common primary tumour of the kidney, accounting for approximately 85% of adult renal malignancies [1-4]. It represents 3% of new cancer diagnosis, with a male to female predominance of 2.5:1 [1-4]. The classical clinical presentation includes hematuria, flank pain and a palpable mass [1-4]. Patients with advanced disease, as it was our patient, may have a variety of constitutional symptoms as fever, anorexia, malaise and weight loss.

CT is considered the imaging modality of choice for the diagnosis and characterization of renal cell carcinoma [1-9]. Advances in multidetector CT technology, namely reduced slice collimation, multiplanar reformatting and 3D reconstructed imaging greatly improved the diagnostic performances of the technique in patients with renal malignancies [1,2]. The typical signs for the diagnosis of RCC include the presence of a solid tumour,
inhomogeneous when larger than 3cm in diameter on non-enhanced CT scans, due to presence of haemorrhage or necrosis. The mass typically enhances strongly and heterogeneously after contrast material administration [1-3]. The above CT features were met in this case. The presence of strong and inhomogeneous enhancement is considered the hallmark for the diagnosis of RCC, more often seen with the clear cell RCC, as in this patient, than with the non-clear cell types [3,10,11].

CT is also considered the most effective modality in staging of RCC [1-12]. One of the commonest staging errors with CT is under- and overstaging of perinephric invasion [1, 2]. MDCT scanners permit an accurate detection of even small-sized tumour enhancing nodules in the perinephric space, which is accepted as a specific finding of tumoural spread, and was seen also in this patient.

RCC spreads predominantly via direct extrarenal extension, lymphatic dissemination or venous invasion [1-12]. The most common sites of metastases include the lung (50-60%), bones (30-40%), liver (30-40%), and adrenal gland, contralateral kidney, retroperitoneum and brain (5%, each) [12]. Like RCC, metastatic deposits tend to be hypervascular, as it was in our case.

The peritoneum is a common site for metastatic involvement and primary malignancies that most commonly give rise to peritoneal carcinomatosis are the ovaries, gastrointestinal tract and pancreas [13-15]. Peritoneal metastases from RCC are very uncommon, reported in approximately 1% of patients with metastatic disease at autopsy [16, 17]. Neoplastic involvement of the peritoneum by RCC may occur either, by contiguous spread of renal malignancy through the renal capsule, the anterior renal fascia and the posterior parietal peritoneum, or via tumoural emboli [16, 17]. MDCT scanners due to the acquisition of thin slices and the creation of multiplanar reformations improved the sensitivity of CT in detecting peritoneal carcinomatosis, by allowing the recognition of sub centimetre peritoneal implants and the detailed evaluation of curved peritoneal reflections, like the undersurface of the diaphragms, paracolic gutters and pelvis [13].

**Differential Diagnosis List:** Renal cell carcinoma with peritoneal metastases

**Final Diagnosis:** Renal cell carcinoma with peritoneal metastases

**References:**


AJR Am J Roentgenol 178:1499-1506. (PMID: 12034628)
Figure 1

(a) Transverse non-enhanced CT image demonstrates a large, inhomogeneous right renal mass (asterisk). There is also perinephric stranding (small arrows) and a small amount of ascites (arrow). Origin:

(b) Contrast-enhanced (arterial phase) transverse and coronal multiplanar reformatted (MPR) images show the renal tumor (asterisk) enhancing strongly and heterogeneously, a finding compatible with the diagnosis of renal cell carcinoma. There are tumor nodules (small arrow) in the perinephric space, inhomogeneously enhancing, a finding indicating perinephric spread of the neoplasm. Ascites (arrow). Origin:
Description: Contrast-enhanced (arterial phase) (b) transverse and (c) coronal multiplanar reformatted (MPR) images show the renal tumor (asterisk) enhancing strongly and heterogeneously, a finding compatible with the diagnosis of renal cell carcinoma. There are tumor nodules (small arrow) in the perinephric space, inhomogeneously enhancing, a finding indicating perinephric spread of the neoplasm. Ascites (arrow). Origin:
**Description:** (d, e) Coronal 3-dimensional (3D) reconstructed images depict renal malignancy (asterisk) and neoplastic nodules (arrow) in the perinephric space. **Origin:**
Description: (a) Transverse, (b) coronal post-contrast reformatted images, and (c) coronal 3D images show multiple peritoneal metastases (small arrows), detected as nodules with heterogeneous enhancement, identical to that of the primary neoplasm. Origin:
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Description: (a) Transverse, (b) coronal post-contrast reformatted images, and (c) coronal 3D images show multiple peritoneal metastases (small arrows), detected as nodules with heterogeneous enhancement, identical to that of the primary neoplasm. Origin:
Description: Coronal MPR demonstrates lung metastases (arrows). Renal carcinoma (asterisk).

Origin: