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Inferior vena cava tumors – diagnostic difficulties

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Summary

Background:

We present a patient with a diagnosis of tumor within the vena cava inferior, which was detected during screening abdominal ultrasound examination.

Case Report:

Repeated abdominal ultrasound examination, CT and MRI were performed in order to make diagnosis more precise. Imaging revealed the tumor within the lumen of dilated inferior vena cava, which was significantly obstructed by tumor masses. Final diagnosis was made on the basis of postoperative histopathological and immunohistochemical findings, which confirmed the renal cell carcinoma within the inferior vena cava, without any detectable lesion in kidneys.

Conclusions:

Despite imaging of retroperitoneal tumors allows accurate assessment of morphology and extent of tumor masses, it is often required to perform surgery and histopathological examination to state the final diagnosis.

Key words:

retroperitoneum • tumor • inferior vena cava

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Background

The differential diagnosis of the tumors occurring in the retroperitoneal area, combined with inferior vena cava infiltration can be difficult. There can be clear cell carcinoma of the kidney, adrenal cortex tumors, pheochromocytoma and rarely occurring primary leiomyosarcoma tumors originating from the vessel wall in that area [1]. The primary location of the tumor and its staging are usually determined on the basis of imaging examinations such as: ultrasonography, computed tomography (CT) or magnetic resonance imaging (MRI). In the questionable cases it is intrasurgical diagnosis complemented by histopathological and immunohistochemical examination that is the determining factor [2–6].

Renal cell carcinoma is the fifth most common cancer in adults and accounts for about 90% of all malignant lesions of the kidney [3]. Vascular tumors of the inferior vena cava are really uncommon. There have been described as few as over 210 case reports on such lesions [5–9].

Case Report

The patient, female aged 42, was admitted to the hospital having been initially diagnosed of the tumor of inferior

vena cava. The diagnosis had been produced on the basis of the screening abdominal ultrasound examination. The patient had not reported either pain or body weight loss. The family history proved negative.

The physical examination of the medial midabdomen showed the existence of the distinct, heterogeneous resistance. As a result of the check-up ultrasound examination a heterogeneous, oval, smoothly outlined solid lesion was detected in the inferior vena cava. The lesion measured 5 cm in diameter and was located at the same level as the renal veins confluence and it occluded vascular lumen in 90% (Figure 1). Both the kidneys were regularly sized, neither concrements nor urinary retention were determined. However, CT imaging indicated a considerable dilation of the inferior vena cava to 5.5 cm in diameter, over 6 cm long, with heterogeneous masses in its lumen, allowing for a poor blood flow through these masses. The identified lesion was differentiated between partially recanalized thrombus and the primary vein tumor with concomitant thrombosis (Figures 2A,B,3A,B)

MRI proved the presence of the tumor, which was localized within the inferior vena cava, at the level of confluence of the renal veins. The tumor was almost entirely blocking the lumen of the invaded vessel, accompanied by thrombosis.



Figure 1. Abdominal ultrasound examination. The solid tumor visible within the vena cava inferior.

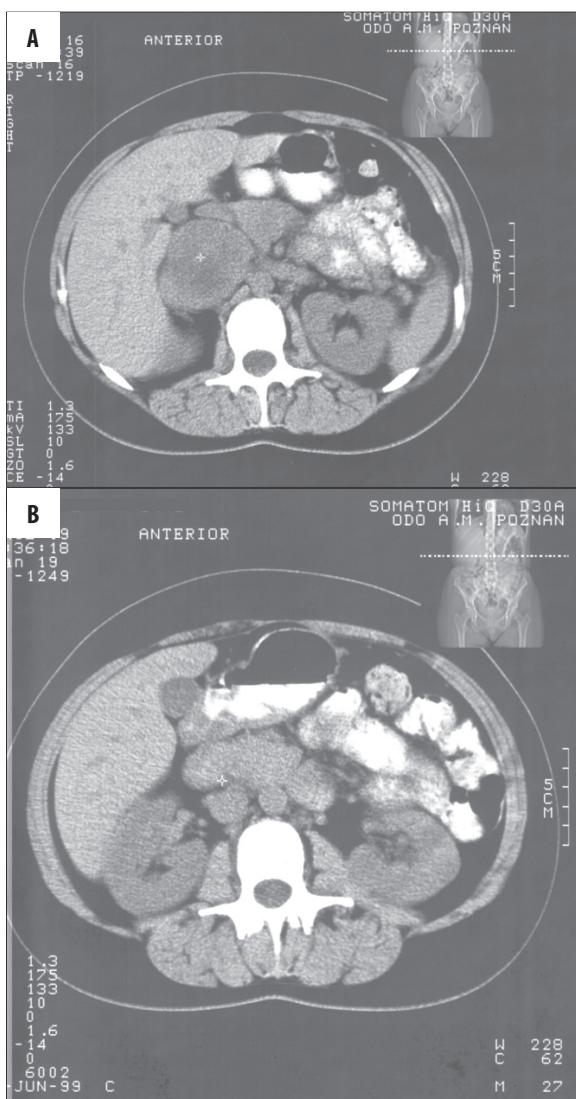


Figure 2. CT before intravenous contrast agent administration. (A) Heterogenic mass of tumor visible in the area of vena cava inferior. (B) No visible pathology within both kidneys.

The tumor revealed a diminished signal in the T1w imaging and an increased signal in T2w and contrast enhanced imaging (Figure 4A-C).

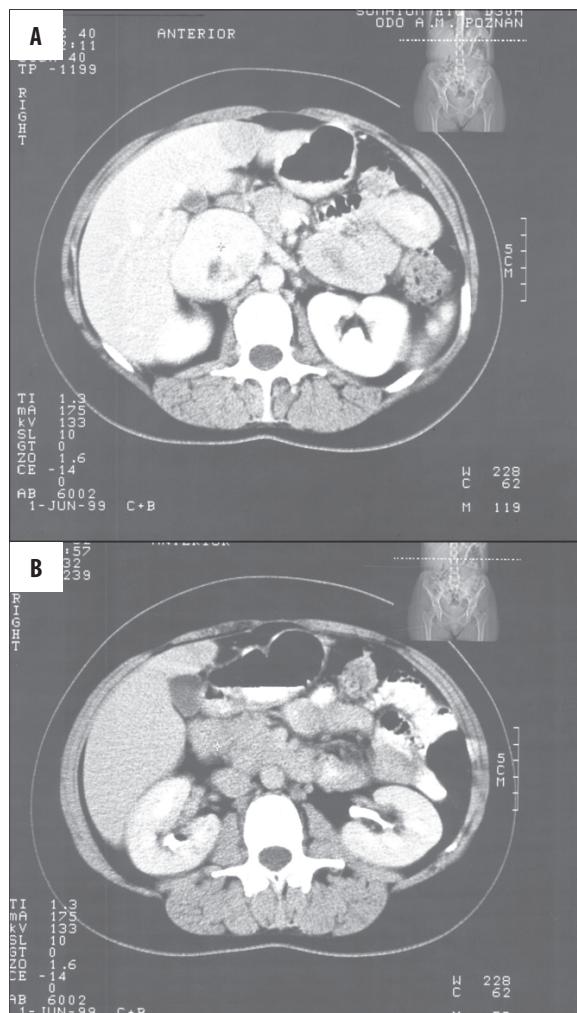


Figure 3. Contrast enhanced CT. (A) Intensive enhancement of tumor masses accompanied by thrombosis in vena cava inferior (tumor masses and thrombus inside the lumen). (B) Both kidneys without visible pathology.

Since no definite diagnosis was produced, the patient was qualified for surgery and tumor was resected.

The tumor was extensively ingrowing into the side wall of the inferior vena cava and it was accompanied by thrombosis with chronic fibrosis. During the operation the renal artery was damaged, but it was reconstructed subsequently. A fragment of the vein was removed in order to enable the blood flow. Histopathological examination of the postoperative material proved the existence of the renal cell carcinoma.

Discussion

Tumors developing in the retroperitoneum with the secondary infiltration of the large vessels are difficult to differentiate between the primary tumors originating from the inferior vena cava [2,3,7,8].

The primary tumors of the inferior vena cava are very rare, they both grow towards the vascular lumen and involve its exterior wall. They are found in women under 40, usually with no neoplastic history in the family [8-10].

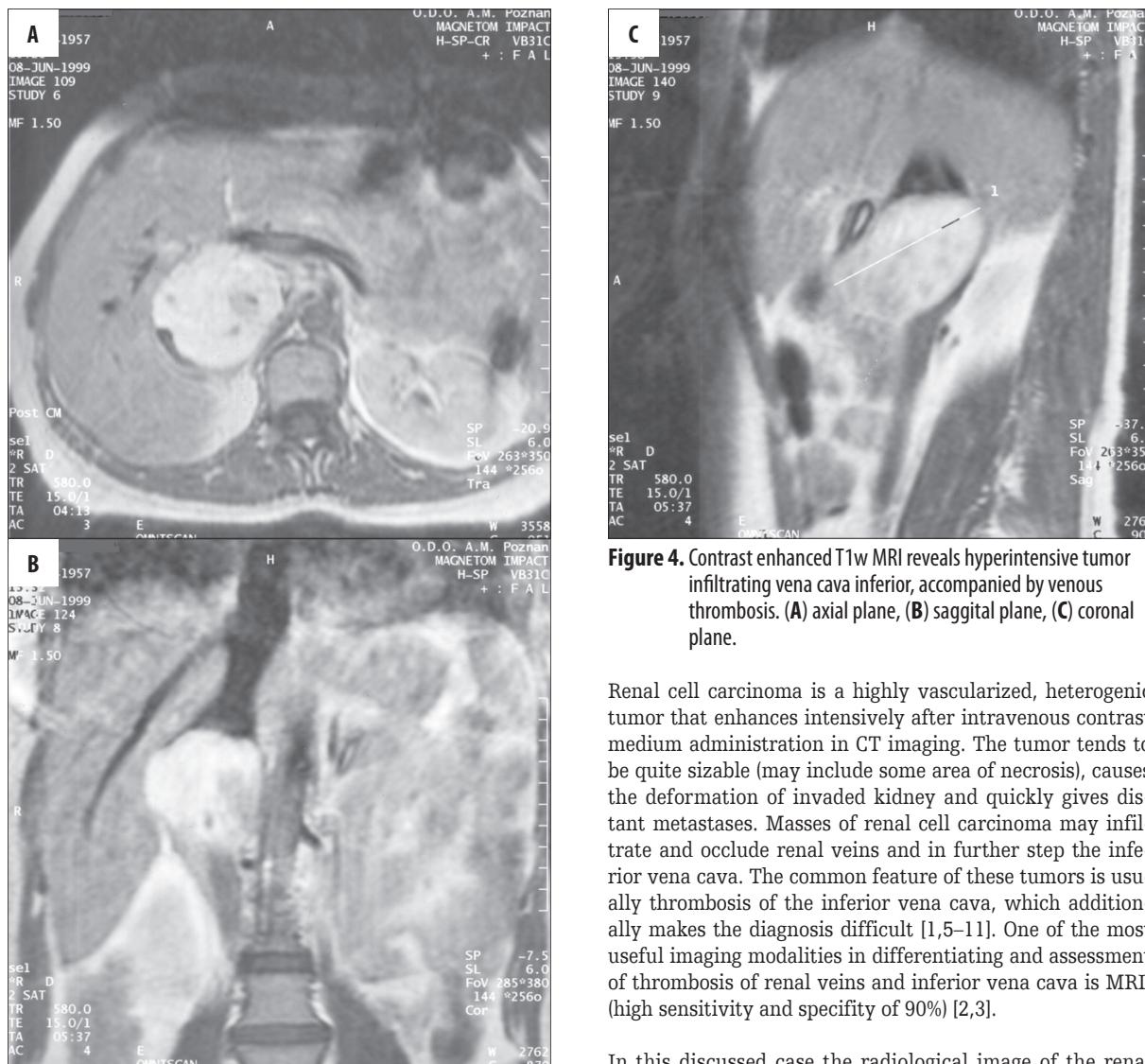


Figure 4. Contrast enhanced T1w MRI reveals hyperintensive tumor infiltrating vena cava inferior, accompanied by venous thrombosis. (A) axial plane, (B) sagittal plane, (C) coronal plane.

Renal cell carcinoma is a highly vascularized, heterogenic tumor that enhances intensively after intravenous contrast medium administration in CT imaging. The tumor tends to be quite sizable (may include some area of necrosis), causes the deformation of invaded kidney and quickly gives distant metastases. Masses of renal cell carcinoma may infiltrate and occlude renal veins and in further step the inferior vena cava. The common feature of these tumors is usually thrombosis of the inferior vena cava, which additionally makes the diagnosis difficult [1,5-11]. One of the most useful imaging modalities in differentiating and assessment of thrombosis of renal veins and inferior vena cava is MRI, (high sensitivity and specificity of 90%) [2,3].

In this discussed case the radiological image of the renal tumor and primary tumor of the inferior vena cava were difficult to differentiate. That was mainly due to the fact that both the kidneys did not reveal any abnormalities. Furthermore, no lesions were found in the lymph nodes, and the tumor in the vena cava inferior being 5cm in diameter was intensively marked in contrast enhanced CT scan. The lesion was accompanied by thrombosis. The patient's young age, nonspecific clinical symptoms probably related to the slow growth of the tumor could have indicated rarely occurring primary tumor of the inferior vena cava extensively involving the vessel wall, which was proved to be the case in ultrasound, CT and MRI. The tumor was located in the middle segment of the inferior vena cava and caused rapid development of thrombosis. In MRI the tumor was hypointensive in T1w imaging and hiperintensive in the T2w imaging. It also enhanced after the administration of contrast medium and revealed growth involvement into the inferior vena cava wall (Figure 4).

In the case of neoplastic lesion in inferior vena cava the prognosis depend on the tumor's size, localization, (lesion found in the supradiaphragmatic section of the inferior vena cava wall gives the most unfavorable prognosis) and

One of the most frequent tumors of the retroperitoneum is the renal clear cell carcinoma, which tends to grow slowly, often with no discernible symptoms and is usually diagnosed in men over 60. In about 6% of the cases the carcinoma is poorly separated and it infiltrates the adjacent organs [2].

The clinical symptoms of the retroperitoneal tumors are non-specific, they occur late and depend upon the size and location of tumor. These are Budd-Chiari syndrome, the lower limbs edema, stomachache or spinal ache or noticeable tumor in the abdominal cavity [1,5,8]. The most basic imaging that allows for the determination of the tumor in the retroperitoneum is ultrasound examination, however it is the CT scan that provides details in demonstrating the size and extent of the infiltration, the progression of the disease (possible metastases to bones, the liver, lungs, kidneys and lymph nodes) as well as the location of the tumor as against the vessels.

In ultrasound examination leiomyosarcoma tumors tend to be distinctly connected to the vessel wall, forming poorly vascularized hypoechogenic mass. In CT they may peripherally enhance after contrast medium administration.

staging of disease. The patient was qualified to surgical resection of the tumor. The material taken intraoperatively for the histopathological assessment proved the existence of the renal clear cell carcinoma.

The treatment is radical removal of the tumor with the invaded part of the vessel and subsequently prosthetic restoration of inferior vena cava [1,3–6]. Some cases additionally require chemo- and radiotherapy. That not only prolongs the patients' lives but it significantly improves their comfort as well [6].

References:

- Boneschi M, Miani S, Erba M et al: Malignant neoplasms invading into the inferior vena cava. Surgical indications. *Minerva Cardioangiologica*, 1995; 43(3): 91–95
- Kim J: Imaging findings of renal cell carcinoma. *Expert Rev Anticancer Ther*, 2006; 6(6): 895–904
- Dighe M, Takayama T, Bush W Jr: Preoperative planning for renal cell carcinoma—benefits of 64-slice CT imaging. *Int Braz J Urol*, 2007; 33(3): 305–12
- Franke UF, Wahlers T, Wittwer T et al: Renal carcinoma with caval vein infiltration and triple coronary disease: one-stage surgical management. *Eur J Cardiothorac Surg*, 2001; 20(4): 877–79
- Shen ZJ, Zhou XL, Yu YL et al: One case of leiomyosarcoma of the inferior vena cava treated with radical resection and vascular reconstruction: *Vasc Med*, 2005; 10(3): 225–27
- Hollenbeck ST, Grobmyer SR, Kent KC et al: Surgical treatment and outcomes of patients with primary inferior vena cava leiomyosarcoma. *J Am Coll Surg*, 2003; 197(4): 575–79
- Sarkar R, Eilber FR, Gelabert HA et al: Prosthetic replacement of the inferior vena cava for malignancy. *J Vasc Surg*, 1998; 28(1): 75–81
- Shvarts O, Han KR, Lam JS et al: Primary leiomyosarcoma of the inferior vena cava presenting as a renal mass. *Rev Urol*, 2004; 6(1): 39–42
- Ahluwalia A, Saggar K, Sandhu P et al: Primary leiomyosarcoma of inferior vena cava: an unusual entity. *IJR*, 2002; 12(4): 515–16
- Hilliard NJ, Heslin MJ, Castro CY: Leiomyosarcoma of the inferior vena cava: three case reports and review of the literature. *Ann Diagn Pathol*, 2005; 9(5): 259–66
- Burke AP, Virmani R: Sarcomas of the great vessels. A clinicopathologic study: *Cancer*, 1993; 71(5): 1761–73

Conclusions

Imaging of retroperitoneal tumors may be challenging. Despite ultrasound, CT and MRI depict precisely the morphology and extent of tumor masses, it is often required to perform the surgery and histopathological examination to state the final diagnosis.