Introduction

Oncocytoma is a benign, slow-growing renal tumor usually detected incidentally in older men (1). At imaging the oncocyтомas, especially when large and heterogeneous, frequently are not easily distinguishable from renal tumor (2,3) and diagnosed only after surgery. Conversely, we report on the case of a typical oncocytoma incidentally found in a young woman, which was preoperatively diagnosed because of the presence of spoke-wheel appearance at color-Doppler sonography, and the presence of a central scar, clearly identified by MRI.

Case report

A 35-year-old female, because of a suspected post-partum hemorrhagic complication underwent a CT scan which revealed a retroperitoneal hematoma and a 3 cm left renal solid lesion. The lesion was hypodense, with no obvious lymphadenopathy or vascular involvement. For further characterization, she subsequently was referred to MRI and US-Color-Doppler examinations. At sonography the lesion appeared well marginated, isoechoic, with a central hyperechoic area. Color-Doppler application revealed perivascular distribution, the so-called “spoke wheel” appearance. At MRI examination the lesion was hypointense on T1 weighted sequences and isointense on T2 ones, with a small pseudocapsule and an hypointense central scar. The lesion showed progressive centripetal enhancement. These findings were suggestive for renal oncocytoma. The patient underwent to renal partial resection. Histopathological examination confirmed our radiological diagnosis.
radiating centripetal internal vessels such as called “spoke-wheel” appearance (Fig. 2b). MRI showed a hypointense mass on T1-weighted image sequence (Fig. 3a), and isointense with hyperintense central scar and a thin capsule on T2-weighted one (Fig. 3b). Dynamic MRI revealed a peripheral and progressive enhancement (Fig. 3c). Both the US and MRI findings, such as “spoke wheel” color-Doppler appearance, the evidence of the central scar and the pseudocapsule and absence of signs of invasiveness of the lesion, were suggestive for a benign renal oncocytoma. The patient underwent nephron sparing surgery. The histopathological examination and hynmuno-histochemical studies consisting of the research of intracytoplasmic ring-like positive reactions for some cytokeratins, which corresponded ultrastructurally to the intracytoplasmic lumens (ICLs) confirmed this diagnosis.

Figure 1. 35 years-old woman with renal oncocytoma. Unenhanced CT scan (a) shows a solid isodense mass in the left kidney, with regular margins and no obvious lymphadenopathy or vascular involvement. During the late phase of the contrast-enhanced CT (b) the mass results homogeneously hypodense, with no signs of necrosis or hemorrhage.

Fig. 1. Donna di 35 anni con oncocitoma renale. La TC con mezzo di contrasto (a) mostra una massa solida isodensa nel rene sinistro, con margini regolari, assenza di linfadenopatie evidenti e coinvolgimento vascolare. In fase tardiva (b) la massa appare omogeneamente ipodensa senza segni di necrosi o emorragia.

Figure 2. Abdominal sonography (a) shows a small well capsulated, hypoechoic mass, with a mild central hyperechoic area. Color-Doppler sonography (b) shows a spoke-wheel vascular appearance.

Fig. 2. L’ecografia addominale (a) mostra una piccola massa ipoecegena e ben capsulata con un’area centrale iperecogeno. L’aggiunta del Color-Doppler (b) mostra una vascolarizzazione cosiddetta “a ruota di carro”. 
Figure 3. MRI shows a hypointense mass in the T1-weighted image sequences (a). On T2-weighted image sequence (b): the mass results isointense with hyperintense pseudocapsule and hyperintense central scar. After gadolinium injection the lesion presents a progressive centripetal enhancement (c).

Discussion

Oncocytoma or adenoma with oncocytic features, is a rare benign solid renal tumor, accounting for about 3-5% of resected renal masses (4). It affects men twice as often women, and, in general, patients are older than those with renal cell carcinoma. Contrary to other renal tumors, no association with von Hippel-Lindau, tuberous sclerosis, or chronic dyalisis have been reported (5).

Oncocytomas is a low-growing mass, usually single, well-demarcated, uniformly expansile mass occurring at any site. Very rarely multiple oncocytesomas occurring simultaneously and extensively, have been described. Occasionally, oncocytomas become very large (so-called giant oncocyteoma).

Although metastases is rarely described, the possibility of malignant transformation exists. Therefore, lifelong monitoring with imaging studies is recommended.

It is generally incidentally detected (6). However, if large enough, it may cause a palpable abdominal mass, pain, and hematuria and these findings lead to an investigation for malignancy of the urinary tract.

At imaging oncocyteoma appears as a focal, well-margined, homogeneous mass.

At CT, it appears lhyosdense or very slightly less dense than normal renal tissue at unenhanced CT (7). Contrast enhancement is generally homogeneous and less than surrounding renal parenchyma, therefore the lesion appears as hypodense lesion during the late phase. Although a central scar is commonly seen on gross morphology, it can only be identified in 50% of cases by CT as a central, stellate area of low attenuation (5).

The presence of a central scar or stellate architecture, the absence of hemorrhage and necrosis and the presence of a pseudocapsule are other elements to differentiate an oncocyteoma from a renal carcinoma. However, this pattern may overlap the appearance of central necrosis seen with some adenocarcinomas and cannot be used as a reliable indicator for the diagnosis of oncocyteoma. An angiographic spoke-wheel pattern is known to be associated with oncocyteomas, although it is not pathognomonic (5).

There have been cases in which this spoke-wheel pattern was also identified by helical CT (8). Most oncocyteomas are mildly hypoechoic at US, but rarely also echogenic (7) and may be indistinguishable from malignant lesion. However, the presence of the spoke-wheel appearance and a central scar, as shown by our case by color-Doppler sonography may be suspicious for the diagnosis.

Oncocyteoma may be isointense or hypointense on T1 weighted image (WI) and hyperintense on T2 WI (9).

After Gd-BOPTA, lesions are iso- to slightly hypoattenuating compared to renal parenchyma. The central scar at MRI may be both hyperintense or hypointense (7).

The absence of hemorrhage, necrosis, adenopathy, or venous tumor thrombus are noteworthy, but do not distinguish an oncocyteoma from an adenocarcinoma. CT and MRI should today permit the identification of these lesions preoperatively so that conservative surgery can be employed, especially in the presence of an early or incidental diagnosis (10).

However, when the lesion does not show the spoke wheel appearance in any imaging modalities, and presents a more heterogeneous appearance as always observed in larger lesion (4,11), a preoperative diagnosis is extremely difficult to be reached.

In any case, however, an histological diagnosis is needed, therefore the patient should undergo biopsy or surgical removal.

Unfortunately, renal oncocyteomas and chromophobe renal cell carcinomas (RCCs) share a common phenotype and both originate from the intercalated cells of the collecting duct.

This makes it very difficult to differentiate between the two tumors even at histology.

However, as reported by Kuroda et Al (12), in all of the four renal oncocyteomas they described, intracytoplasmic
ring-like positive reactions for some cytokeratins (at least 3 antigens of cytokeratins 7, 8 and 19, and AE1/AE3), which corresponded ultrastructurally to the intracytoplasmic lumens (ICLs), were identified. In contrast, no such structures were found in any of the chromophobe RCCs using the antibodies employed. Therefore, immunohistochemical identification of ICLs by cytokeratin typing may be useful for differentiating between renal oncocytomas and chromophobe RCCs and be more sensitive in this respect than colloidal iron staining.

In conclusion, renal oncocytoma is a benign neoplasm, characterized by slow growth and excellent prognosis after surgery. Although imaging findings are not always conclusive, however, when a small renal lesion presents the spoke wheel appearance and a central scar, at color-Doppler sonography, at MRI or at CT, as shown in our case, renal oncocytoma should be considered and nephron sparing techniques may be the most indicated treatment.

Bibliografia

References

8) Bandhu S, Mukhopadhyaya S, Aggarwal S. Spoke-wheel pattern in renal oncocytoma seen on double-phase helical CT. Australas Radiol 2003; 47: 298-301

Indirizzo per corrispondenza:
Dott. Vito Cantisani
Dipartimento di Scienze Radiologiche - Policlinico Umberto I - Università La Sapienza - 00167 Roma
E-mail: vitocantisani@sirm.it - vitocantisani@hotmail.com