



Two Solid Tumours in a Transplanted Kidney

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Abstract

A 35-year female otherwise healthy patient 2 years after renal transplantation underwent routine ultrasound examination which revealed two solid lesions within transplanted kidney. The transplantation was performed due to end-stage renal disease caused by chronic glomerulonephritis. The patient received graft from unknown cadaveric donor, the surgery was uneventful. After transplantation the patient received maintenance immunosuppression in form of combination of tacrolimus and mycophenolate mofetil. The patient was referred to MR imaging which confirmed presence of two solid lesions in transplanted kidney showing different radiologic features. The performed biopsy confirmed malignant character of both of them - first lesion was lymphoma and second RCC which was removed through NSS. No other lesions were revealed. The allograft was not removed. After surgery the patient received further treatment.

Keywords: Kidney; Renal transplantation; Neoplasm; Tumour; RCC; Lymphoma; PTLD

Introduction

Transplant recipients have higher prevalence of various malignancies which is considered to be correlated with four [1] potential situations. Influence of chronic use of immunosuppressive agents on neoplastic process is known from 1970s [1]. Transplant patients can develop malignancy de novo or it may be transmitted to the recipient with donor organ. Some patients are previously diagnosed with cancer. All this problems present clinical challenge including diagnosis and management of malignancies.

One of the most common malignancy which occurs in 1% of renal allograft recipients is Post-Transplant Lymphoproliferative Disorder (PTLD).

Risk factors of PTLT are associated with Epstein-Barr viral infection, concomitant cytomegalovirus infection and immunosuppressive regime. For instance allograft involvement is more common with azathioprine therapy [1].

PTLD range from low-grade, benign lymphoid hyperplasia to high grade malignant non-Hodgkin's lymphoma (NHL). Prognosis depends on the grade of the lymphoma, and cell type. Approximate five-year survival is ~35% [1].

There is a tendency of development aggressive non - Hodgkin lymphoma. Large analysis by Opelz and Dohles confirmed that recipients of solid organs transplants are in higher risk than general population (20-fold increase for kidneys) and the risk of PTLT is highest in the first year following operations [1].

Image of renal allograft involvement is similar to the one seen in malignant lymphoma in general. The kidney involvement is typically seen as a part of multiorgan process but it also may be seen as a primary disease [1].

MRI is the optimal method of imaging for patients with renal insufficiency or iodinated contrast allergy. Lymphoma especially occurs near hilum [1]. Typical features in MR include mass/masses which are hypointense to renal parenchyma on T1-weighted images, iso- or hyperintense to renal parenchyma on T2-weighted images and show poor enhancement or sometimes delayed enhancement after intravenous gadolinium administration comparing to renal parenchyma [2].

Next most common malignancy are renal and transitional cell (urothelial) carcinoma, which have both higher prevalence in transplant recipients and can occur in allograft or native kidneys. The

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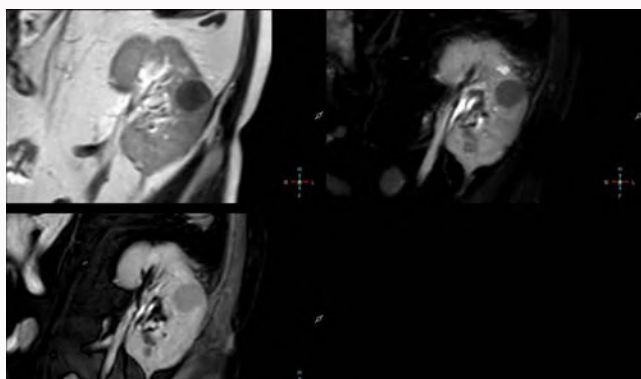


Figure 1: T2W SPAIR and BTFE SPIR images compared to renal parenchyma.

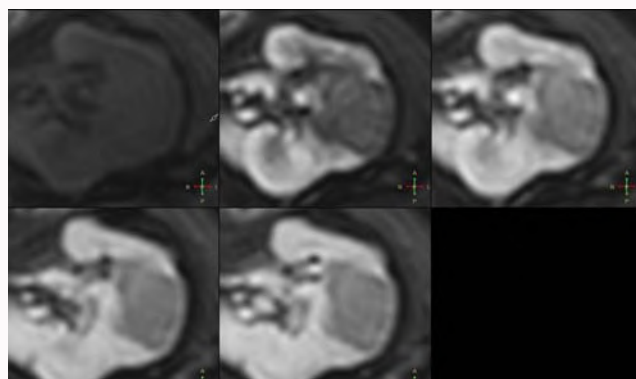


Figure 4: After contrast administration lesion showed subtle contrast enhancement, hypointense rim compared to renal parenchyma.

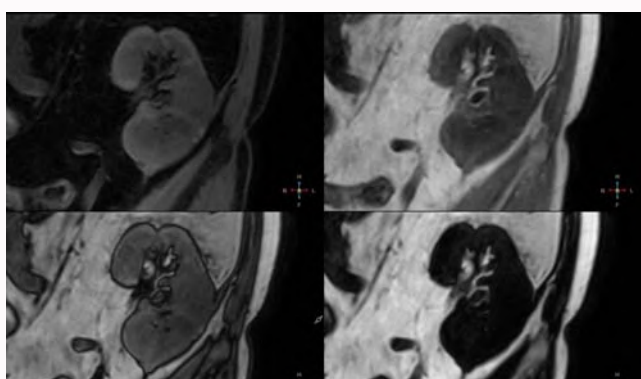


Figure 2: DIXON fat-only sequence revealed no fat content and DIXON water-only sequence showed water content of normal renal parenchyma.

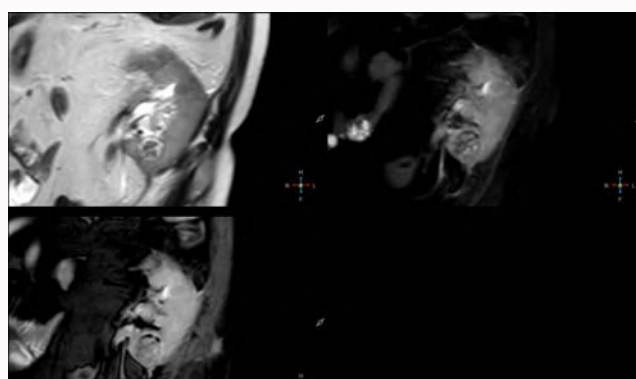


Figure 5: T2W SPAIR sequence showed irregular hypointense septa within lesion.

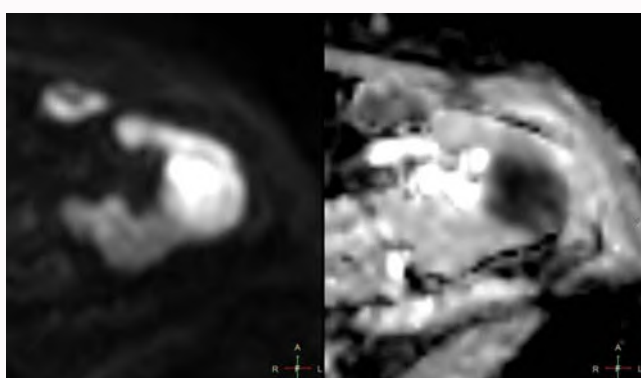


Figure 3: Lesion exhibited high signal on DWI b=800 and markedly restricted diffusion on ADC maps.

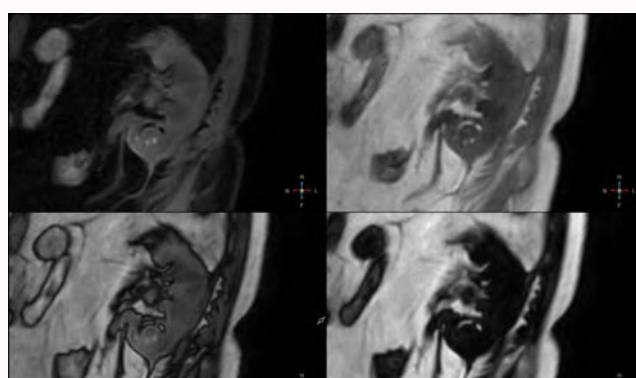


Figure 6: Lesion appeared isointense on DIXON in-phase sequence with irregular areas of increased signal intensity and hypointense peripheral rim.

pathogenesis of renal cell cancer is uncertain. It can be correlated with polycystic kidney disease or acquired cystic kidney disease. Generally RCC in the transplant population is 10 - fold more common [2].

Histopathologic examination confirmed diagnosis of RCC and lymphoma in the same transplanted organ.

Coincidence of two different tumours in transplanted kidney, as in this case, is extremely rare.

Description of MRI Examination Protocol

MRI examination was performed on 3T Philips Ingenia scanner. Protocol included T2W TSE, DIXON, BTFE SPIR, T2 SPAIR,

DWI sequences before IV contrast administration and multiphase e-THRIVE, DIXON sequences after IV administration of 20ml Multihance (Gadolinium-based contrast agent). In order to decrease bowel movement artefacts, prior to examination 20 mg of Buscolysin was injected intravenously.

Examination revealed two solid parenchymal lesions in transplanted kidney with different characteristics.

MRI Findings

First lesion, round in shape with sharp margins, 27mm in diameter, was located in the medial part of the kidney and showed homogeneously decreased signal intensity on T2W, T2W SPAIR and

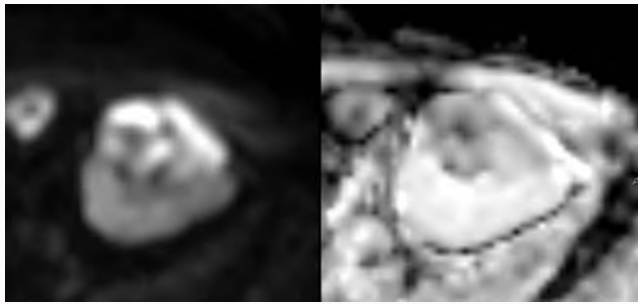


Figure 7: Lesion exhibited regions of high and low signal on DWI corresponding to inhomogenously restricted diffusion on ADC maps.

BTfE SPIR images compared to renal parenchyma (Figure 1).

DIXON in-phase images showed signal intensity of normal kidney parenchyma with no signal drop in out-of-phase images. DIXON fat-only sequence revealed no fat content and DIXON water-only sequence showed water content of normal renal parenchyma (Figure 2).

Lesion exhibited high signal on DWI $b = 800$ and markedly restricted diffusion on ADC maps (Figure 3). After contrast administration lesion showed subtle contrast enhancement, hypointense rim compared to renal parenchyma (Figure 4).

Second, ball-shaped lesion, 20 mm in diameter, was located in the lower pole of the kidney and showed inhomogenously decreased signal intensity on T2W, T2W SPAIR and BTfE SPIR images with peripheral rim hypointense on T2 TSE and hyperintense on T2 SPAIR and BTfE SPIR images. T2W SPAIR sequence showed irregular hypointense septa within lesion (Figure 5). Lesion appeared isointense on DIXON in-phase sequence with irregular areas of increased signal intensity and hypointense peripheral rim (Figure 6). DIXON water-only sequence revealed small fluid areas in the lower aspect of the lesion and crescent shape fat signal in the upper aspect of the lesion. Signal drop in out-of-phase images surrounding fat content was noted (Figure 6).

Lesion exhibited regions of high and low signal on DWI corresponding to inhomogenously restricted diffusion on ADC maps (Figure 7). After administration of contrast agent no contrast enhancement was noticed (Figure 8).

Differential Diagnosis

Lesion in the medial part of kidney

Renal Lymphoma: Most common malignant tumour in transplanted kidney. Usually presents as multiple homogenous implants although can also appear as solitary mass.

Typically presents as homogenous mass, iso- to hypointense on T1W images and hypointense on T2W images. Typically strongly restricts diffusion due to densely packed cells. Shows mild contrast enhancement.

Lesion in the lower pole

Although differential diagnosis of solid kidney lesions is broad, one should always consider malignant process in immunosuppressed patient.

Radiological appearance of renal cell carcinoma varies greatly. Typically it has isointense to low signal on T1W, with parts of increased signal intensity due to internal haemorrhage (methemoglobin signal).

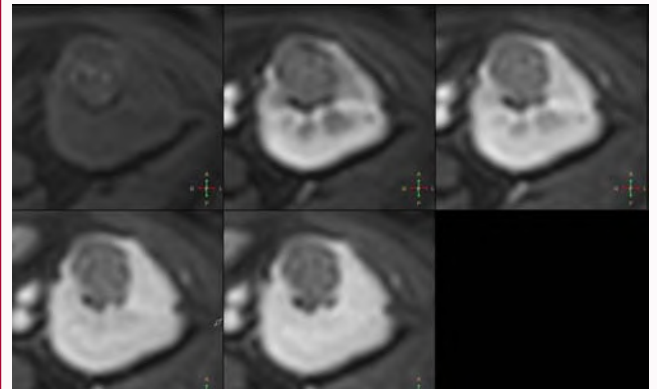


Figure 8: After administration of contrast agent no contrast enhancement was noticed.

Papillary RCC has decreased signal T2 intensity opposed to Clear Cell RCC with typically increased T2 signal. Papillary RCC often appears with pseudocapsule presenting as hypointense rim on T1W and T2W images. Some RCC can mimic AML due minimal fat content and present loss of signal on out of phase images. RCC presents partly with restricted and partly facilitated diffusion. Contrast enhancement usually reveals inhomogenously enhancing lesion, usually relatively hypovascular compared to normal renal parenchyma. Radiological picture of renal cell carcinoma in immunosuppressed patient can be different from that of individual with normally functioning immune system.

Renal oncocytoma is often very difficult to distinguish from RCC. It is encapsulated tumour typically isointense to low signal intensity on T1W and intermediate signal intensity on T2W images. On T2W images central scar area can appear hyperintense and mimic central necrosis. True necrotic, hemorrhagic, calcific or cystic component is very rarely seen in oncocytoma. DWI and contrast enhancement also shows similar pattern to RCC.

Renal Lymphoma

Described above

Angiomyolipoma: AML can appear similar to RCC with minimal fat content. AML shows high, heterogeneous signal intensity on T1 and T2W images, signal loss in out of phase images. It can show signs of internal haemorrhage but very rarely presents with internal septa. Diffusion weighted imaging and contrast enhancement cannot reliably differentiate AML from malignant and other benign tumours.

Radiologic diagnosis

Lesion located in the medial part of the kidney is solid, shows strong diffusion restriction and little contrast enhancement. Considering morphology and clinical history of the patient renal lymphoma must be suspected.

Lesion located in the lower pole of the kidney is mainly solid with some septa, small cystic/water component and minimal fat content. Shows no contrast enhancement. Considering morphologic features and immunosuppression of the patient, radiologic diagnosis of RCC was suggested.

Conclusion

Although occurrence of two different tumours in one organ is rare it must always be taken into consideration especially in immunosuppressed patient.

Images Description

1 – Coronal T2 TSE, T2 SPAIR and BTFE SPIR images. Round-shaped lesion located in medial part of kidney appears homogeneously hypointense compared to renal parenchyma.

2 – Coronal DIXON water-only, in-phase, opposed-phase and fat only images. Lesion appears isointense to normal renal parenchyma with no fat content and no signal drop-out in opposed phase.

3 – Axial DWI b800 sequence and ADC maps. Lesion shows high signal intensity on DWI b800 corresponding to strong diffusion restriction confirmed on ADC maps.

4 – Axial multiphase e-Thrive sequences. Lesion in the medial portion of the kidney shows no contrast enhancement in any phase.

5 – Coronal T2 TSE, T2 SPAIR and BTFE SPIR images. Round-shaped lesion located in the lower pole of the kidney appears inhomogeneously hypointense compared to renal parenchyma. Note peripheral rim around the lesion – hypointense on T2 TSE and hyperintense on T2 SPAIR and BTFE SPIR images and hypointense septa best appreciated on T2 SPAIR images.

6 – Coronal DIXON water-only, in-phase, opposed-phase and fat only images. Lesion appears isointense on DIXON in-phase sequence with irregular areas of increased signal intensity and hypointense peripheral rim. DIXON water only sequence reveals small liquid areas in the lower aspect of the lesion and crescent shape fat signal in the upper aspect of the lesion - note signal drop in opposed-phase images.

7 - Axial DWI b800 sequences and ADC maps. Lesion shows areas of high and low signal on DWI b800 sequence corresponding to inhomogenous diffusion restriction on ADC maps.

8- Axial multiphase e-Thrive sequences. Lesion in the lower pole of the kidney shows no contrast enhancement in any phase.

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