Magnetic Resonance Imaging Findings of Posttransplantation Lymphoproliferative Disorder in Liver and Renal Allograft: a case report

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Posttransplantation lymphoproliferative disorder (PTLD) represents a spectrum of Epstein-Barr virus (EBV)-driven lymphoid proliferation related to immunosuppressive therapy. We here report a case of a 21-year-old male with PTLD of liver and renal allograft simultaneously after renal transplantation. MRI depicted solid mass lesions, which were hypointense on T1-weighted images and heterogeneously hyperintense on T2-weighted images with slight and heterogeneously peripheral enhancement, in both lobes of the liver and renal allograft. Although no pathognomonic imaging findings of PTLD can be appreciated, awareness of the radiologic manifestations is crucial because early detection and appropriate treatment affect outcome.

Key words: Kidney, transplantation; Lymphoma; Magnetic Resonance(MR)

CASE REPORT

A 21-year-old male had a history of bilateral end-stage renal disease induced by mesangial proliferative glomerulonephritis and had received cadaveric renal transplantation after dialysis for nearly 2 years. Immunosuppressive therapy consisting of mycophenolate mofetil (MMF), prednisolone, and prograf (FK506) were administered. About 8 months after transplantation, the patient complained of fever up to 39˚C and right upper quadrant pain for 2 days. Physical examination showed palpable right upper abdominal mass lesion with tenderness, and laboratory tests revealed white blood cell count: 4200 and serum creatinine level: 3.32.

Plain chest X-ray showed no definite pulmonary lesion. Abdominal ultrasound examination (LOGIQ
using a 3.5 MHz convex transducer disclosed three echocomplex mass lesions in both lobes of the liver, one measuring about 8.9 cm in diameter in lateral segment, the second one measuring about 6.4 cm in diameter in medial segment, and the third one measuring about 4.6 cm in diameter in right liver dome. An isoechoic mass lesion measuring about 3 cm in diameter was also identified in the renal allograft in left iliac fossa. No definite hydronephrosis or perinephric fluid collection of the transplant kidney was noted. In the MRI examination obtained on 1.5-T magnet (Signa; GE Medical Systems, Milwaukee, WI), the three hepatic masses appeared hypointense on T1-weighted images (spin echo TR/TE, 400/14ms) and heterogeneously hyperintense on T2-weighted images (fast spin echo TR/TE, 6000/83.4ms echo train:14) (Fig. 1). The nodular lesion in the parenchyma over the middle pole of the transplant kidney showed similar signal intensity as the hepatic lesions (Fig. 2a, 2b). After intravenous injection of gadopentetate dimeglumine (Magnevist; Schering, Berlin, Germany), all of these lesions revealed similar enhancing pattern with slight and heterogeneous peripheral enhancement on fat-saturation dynamic T1-weighted images (fast SPGR, flip angle: 90°, TR/TE, 175/1.7ms) (Fig. 3a, 3b). No definite para-aortic or iliac lymphadenopathy could be identified.

Ultrasound-guided biopsies for the mass lesions in the left lobe of liver and renal allograft were performed respectively. Microscopically, there was extensively necrotic tissue containing sheets of large atypical lymphoid cells which was proved to be B cells by positive test of CD20 (Fig. 4). The diagnosis of diffuse large B cell lymphoma was made upon histopathological evaluation. In addition, serological evaluation and molecular genetic analysis confirmed the primary infection with EBV.

According to the clinical history of renal transplantation and pathologic findings, PTLD was diagnosed. Therefore, the dosage of immunosuppressive agents was reduced and the first course of chemotherapy with Cyclophosphamide, Epirubicin, Oncovin, and Prednisolone was administrated. Because of no substantial improvement, he received segmental hepatectomy for total removal of the hepatic tumor. The pathologic findings confirmed the
diagnosis of post-transplant diffuse large B-cell lymphoma with extensive necrosis. The patient subsequently received chemotherapy for treatment of the lesion in the allograft kidney.

**DISCUSSION**

The reported imaging manifestations of PTLD have included diffuse adenopathy and single or multiple extranodal masses, which are usually within solid organ and may be distant to the allograft [2, 3, 5, 6]. Extranodal involvement (81%) is more frequent than lymph node disease (22%), unlike lymphomas occurring in the general population [3]. In a review by Miller et al. [8] in recent years, the most frequent sites of involvement of PTLD in renal transplant patients were the transplant kidney (69%), brain (24%), and lung (18%). Single or multiple solid masses as the main findings are found in 68% of cases. In our patient, multiple solid extranodal masses in liver and transplant kidney without evidence of other organ involvement were demonstrated at the time of diagnosis.

The clinical manifestations of PTLD are nonspecific and protean. Pickhardt et al. [2] reported that most children with abdominal PTLD present with abdominal pain (52%) or palpable abdominal masses (24%). Fever is also a common sign in diffuse PTLD [2]. Our patient suffered from fever and right upper abdominal pain, probably due to the hepatic capsule stretched by huge masses of PTLD.

The most common pattern of hepatic PTLD are focal nodular lesions. Infiltrative hepatic lesions and porta hepatitis involvement are relatively uncommon [2]. Abdominal lymph node involvement is seen in about 20% of the cases with abdominal PTLD [2]. Sonographic findings of PTLD are nonspecific and include a hypo- or mixed-echogenicity mass [9]. With inconclusive sonographic findings, CT or MRI should be performed to confirm the presence of a mass. CT findings of PTLD are also nonspecific and may

**Figure 3.** a. Axial sections of dynamic fast SPGR T1-weighted images (TR/TE: 175/1.7 ms) with fat saturation after administration of Magnevist show slight and heterogeneous peripheral enhancement of this mass lesion in the middle pole of the transplant kidney over the left iliac fossa. b. Axial sections of dynamic fast SPGR T1WI (TR/TE: 175/1.5 ms) with fat saturation after administration of Magnevist show slight and heterogeneous peripheral enhancement of these hepatic mass lesions similar to that of the lesion identified in the allograft kidney.

**Figure 4.** Microscopic examination reveals diffuse large B cell lymphoma (posttransplantation lymphoproliferative disorder, PTLD) composed of sheets of large atypical lymphoid cells, which proved to be CD20+ B cells. (H&E, 400x)
demonstrate a moderately and often heterogeneously enhancing low-attenuation mass [9]. Central low-attenuating areas from necrosis are infrequent [2]. Calcifications may represent tumor necrosis or sequelae after treatment. Tumor growth in the renal pelvis can cause renal pelvic outflow obstruction [9].

Ali et al. [7] reported a relatively typical MR imaging pattern of renal allograft involved by PTLD that was a hiliar mass with hypointensity on both T1-weighted images and T2-weighted images, traversing renal vessels, and minimal enhancement after administration of contrast medium. By contrast, Claudon et al. [9] pronounced the patterns of PTLD they found with hypointensity signal in T1-weighted images, similar to the renal cortex, hyperintensity on T2-weighted images and marked enhancement after gadolinium administration, which was also observed in dynamic enhancing gradient-echo sequences. The mass appeared heterogeneous hyperintensity as compared with the adjacent renal cortex from the early enhanced phase, and the enhancement progressively decreased in the later phases. In our case, the masses revealed hypointensity on T1-weighted images and heterogeneous hyperintensity on T2-weighted images with slight and heterogeneous peripheral enhancement. But there was no significant difference of the enhancement between images of early enhanced phase and later phase. The different signal intensity and enhancing patterns reported above can be related to the protean manifestations of PTLD itself or varied degrees of tumor necrosis. Extensive necrosis of the tumor, as in our case, could be responsible for the pattern of heterogeneous hyperintensity on T2-weighted images with slightly heterogeneous peripheral enhancement.

The mainstay of treatment is reduction of immunosuppressive dose and may be combined with administration of acyclovir and surgical resection for the control of limited disease [2, 6]. Most tumors may regress with reduction or cessation of immunosuppression and may not respond to conventional antilymphoma chemotherapy [3, 7]. Several reports have suggested that monomorphic morphology of PTLD carries a worse prognosis [8, 10]. If untreated, mortality due to progressive disease is inevitable and can account for up to 15% of all transplantation-related deaths [11].

In conclusion, PTLD should be considered as a diagnostic possibility when complex solid mass lesions are identified in the liver and allograft kidney, especially during the first year after transplantation. Taking note of the clinical and imaging findings of PTLD, the radiologist can suggest the diagnosis and prompt appropriate management.

REFERENCES

移植後淋巴增生疾病在肝臟及移植腎上之磁振造影影像表現：病例報告

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移植後淋巴增生疾病呈現出Epstein-Barr病毒所驅動產生的一系列淋巴增生，而此疾患與免疫抑制治療亦密切相關。在此我們報告一位21歲男性於接受腎移植後罹患肝臟及移植腎之移植後淋巴增生疾病，磁振造影在肝臟兩葉及移植腎上發現數個實質腫塊病灶，呈現出T1低訊號，T2不均勻之高訊號，且在注射顯影劑後呈現不均勻之邊緣顯影增強。雖然移植後淋巴增生缺乏疾病特異性之影像表現，但對其特徵之警覺卻相當重要，因為早期診斷及適當的治療對應後有重要影響。

關鍵詞：腎移植；淋巴癌；磁振造影