

Multiple Nodular lesions In Spleen Associated With Visceral Leishmaniasis

A Case Report of MRI-Findings

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Abstract: The spleen is one of the most commonly involved organs of visceral leishmaniasis (VL). However, there were few reports about imaging findings of splenic leishmaniasis, especially regarding MRI findings.

This case report describes a 45 years old male patient from Zhejiang province of southeastern China, who was admitted for persistent fever of unknown origin, with splenomegaly and multiple hypodense/low echo nodules on CT/ultrasonography (USG) studies. MRI showed multiple nodules with concentric rings in the spleen on T2-weighted imaging (T2WI), with no obvious diffusion restriction on diffusion weighted imaging (DWI), and gradual ring-like enhancement after intravenous administration of contrast medium. So MRI suggested necrotic granulomatous lesion. By reviewing the clinical history and following positive serological leishmania antibody test, the patient was finally confirmed a recent infection with VL.

The patient received antimony gluconate therapy intravenously.

At 4 months follow-up, the contrast-enhanced abdominal MRI showed that the size of the spleen was returned to normal and the splenic lesions were completely resolved except for reduced infarction compared with the previous MRI.

This is the first case which was performed MRI examination completely. Meanwhile, it is the second case which MRI findings were reported. As for the characteristics of MRI in this case, there are several features, which are helpful for giving the diagnosis and differential diagnosis of VL.

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Abbreviations: 18F-FDG = fluorine-18-fluorodeoxyglucose, CRP = C-reaction protein, CT = computed tomography, DWI = diffusion weighted imaging, MRI = Magnetic resonance imaging, PET = positron emission tomography, T1WI = T1 weighted imaging, T2WI = T2-weighted imaging, USG = ultrasonography, VL = visceral leishmaniasis.

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INTRODUCTION

Leishmaniasis, a chronic endemic zoonotic or anthroponotic diseases caused by an obligate intracellular protozoan and transmitted by sandfly bites, is spread over 80 countries in Africa, Asia, south and central America, and Europe.¹ There are 400,000 to 500,000 new cases annually worldwide, with 40,000 to 50,000 deaths.²⁻⁴ This epidemic disease is prevalent in northwest of China. Visceral leishmaniasis (VL) or kala azar is the most insidious form of infection in which the parasites migrate to internal organs such as liver, spleen and bone marrow and is characterized by fever, cachexy, hepatosplenomegaly, pancytopenia, and hypergammaglobulinemia.⁵ VL is often misdiagnosed as long incubation period and no special clinical findings, especially in non-endemic areas. It is usually fatal if the patient was not given timely diagnosis and treatment. The diagnosis for this kind of disease mainly depends on bone marrow and serological examination. Imaging modalities are rarely used in the diagnosis of VL,⁶⁻⁸ especially MRI. So far as we know, there is only one article about the MRI findings of splenic lesion associated with VL.⁸ Now we present another one confirmed clinically whose MRI findings have certain characteristics that can be helpful for the final diagnosis.

PATIENT INFORMATION

In January 2014, a 45-year-old male enterprise administrator from Zhejiang province of southeastern China was admitted to our hospital due to fever of unknown origin and post prandial abdominal distension for a month. The temperature was 38.5 to 39.5 °C and higher in the evening accompanied by obvious night sweats and weight loss.

CLINICAL FINDINGS

The patient was once admitted to local hospital with fever for a week. Physical examination had no positive signs except for the mild epigastric pain. Laboratory findings indicated pancytopenia and increased C-reaction protein (CRP). An abdominal ultrasonography (USG) revealed slight enlarged spleen with heterogeneous parenchyma due to multiple hypoechoic nodules. CT showed mild splenomegaly on plain scan, after intravenous administration of contrast medium, multiple hypodense nodular lesions with mild ring-like enhancement were displayed in the spleen, in which was unenhanced dot (Figure 1). There was increased metabolism of 18F-FDG in the spleen on PET-CT. No other anomalies were found on USG, CT and PET-CT. Lymphoma was suspected at first. However, there was no evidence of lymphoma found by USG guided biopsy of lymph node in the left popliteal space.



FIGURE 1. Post-contrast CT at late portal phase. There was mild splenomegaly and multiple hypodense nodular lesions with slight ring-like enhancement.

DIAGNOSTIC FOCUS AND ASSESSMENT

When the patient entered our hospital, further examination of contrast-enhanced upper abdominal MRI was implemented. The scans were taken on Siemens verio 3.0T MR (Figure 2). MRI demonstrated mild splenic enlargement and multiple inhomogeneous parenchymal lesions besides infarction in the anterior aspect of spleen. There was only slight heterogeneous intensity on T1-weighted imaging (T1WI). On T2-weighted imaging (T2WI), the nodules were demonstrated as multiple concentric rings. The central area in some nodules was a dot of hyperintensity, and the middle part was ring-like hypointense within which was another ring with slight hyperintense in part of the nodules, and the most outer ring was hyperintensity surrounding the nodule. Diffusion weighted imaging (DWI) with b value 1000 showed the lesions as slightly hypointensity and sometimes a dot of lower hypointensity in center. The middle ring of the nodule on T2WI was gradually enhanced after contrast administration, and finally demonstrated as higher intensity than the surrounding normal splenic parenchyma at late delayed phase, while the central and the most outer area which was hyperintensity on T2WI had no enhancement. According to MRI findings, splenic necrotic granulomatous

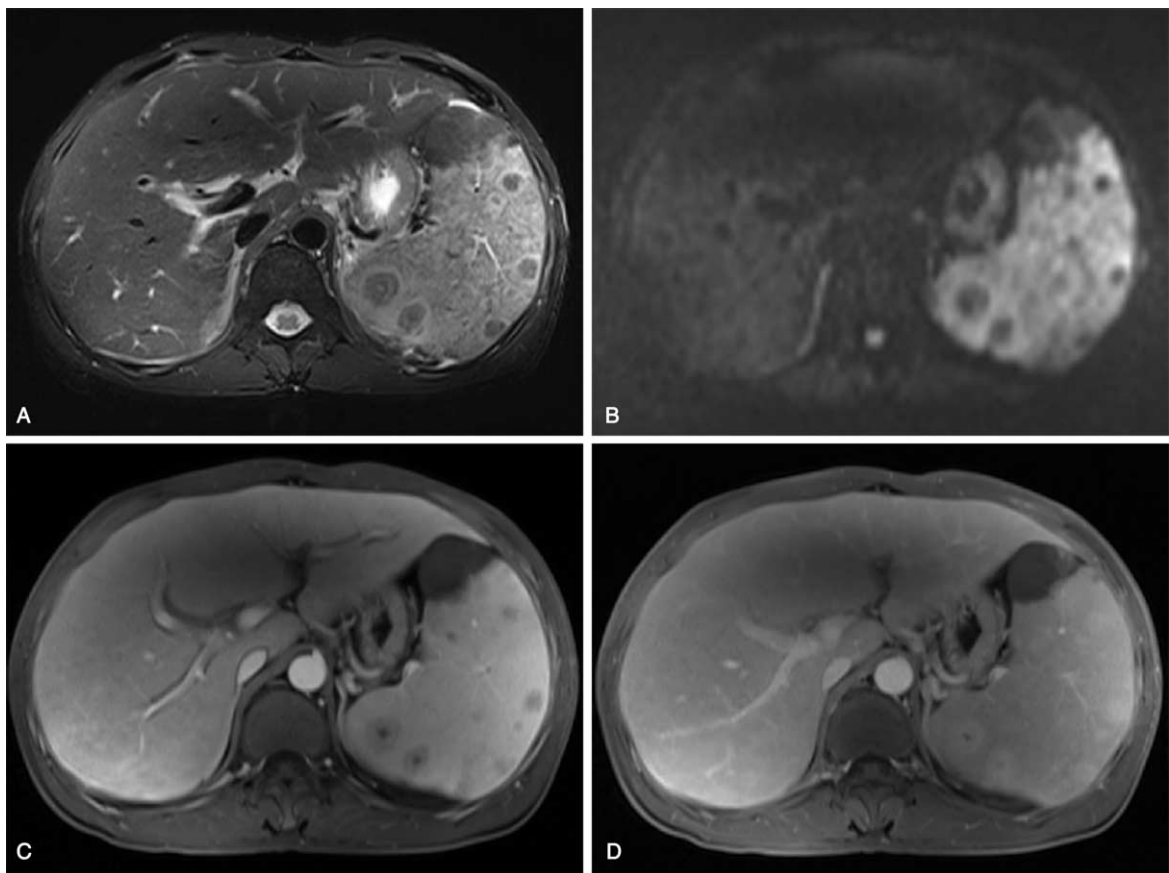


FIGURE 2. MRI The spleen was mildly enlarged. Multiple nodules through the splenic parenchyma were seen besides infarction in the anterior aspect of spleen. The lesions were displayed as concentric rings with dot hyperintensity in central area, hypointensity in the outer ring within which was another ring with slight hyperintense in part of the nodules, and the most outer ring was hyperintensity surrounding the nodule on T2WI (A), slightly hypointensity and sometimes a dot of lower hypointensity in center on DWI (B). After contrast administration, the lesions slightly enhanced as ringlike in shape at portal phase (C), and finally became relative higher intensity than surrounding normal splenic parenchyma at late delayed phase (D). The central and the most outer area, which was hyperintensity on T2WI had no enhancement.

disease was considered, and lymphoma, metastasis, and hemangioma could be ruled out as well.

The repeated diagnostic tests for plasmodium, bacterial abscess and tuberculosis were negative, and parasitic disease was suspected. Further reviewing the travel history reminded the patient that he had been to Xinjiang autonomous region of northwestern China early. The tests of peripheral blood and bone marrow aspirate for parasitic antibody were detected in the specialized institute, and the serological leishmania antibody test was positive. Then, the clinical diagnosis of leishmaniasis was made.

THERAPEUTIC INTERVENTION AND FOLLOW-UP

The following treatment was given at once, with intravenous administration of 0.6 g antimony gluconate per day for 17 days. During and after the former treatment, the temperature was significantly declined and came to normal, blood cells and CRP came to normal ranges. No side effect, adverse and unanticipated event occurred.

The contrast-enhanced abdominal MRI was repeated 4 months later after treatment. The size of the spleen was returned to normal and the splenic lesions were completely resolved except for reduced infarction compared with the previous MRI (Figure 3). The final diagnosis was made: lesions in spleen associated with VL.

DISCUSSION

The diagnosis of VL is based on clinical, epidemiological, and laboratory approaches.^{9,10} The main clinical symptoms are fever, splenomegaly, weight loss, anemia, cough, hepatomegaly, and so on. However, these findings are non-specific.¹¹ Definitive diagnosis of the disease relies on the detection of amastigotes in an aspirate of the spleen or bone marrow. The diagnosis could be easily missed because of few donovani on bone marrow smear and their atypical shape. Spleen biopsy is rarely used due to certain risks. Serological testing is available but not specific, as cross-reactions do exist with granulomatous disease (tuberculosis, cat-scratch disease).

USG is frequently used to investigate the splenic involvement of VL. The common manifestations are mild to remarkable splenomegaly and heterogeneous echotexture with multiple focal

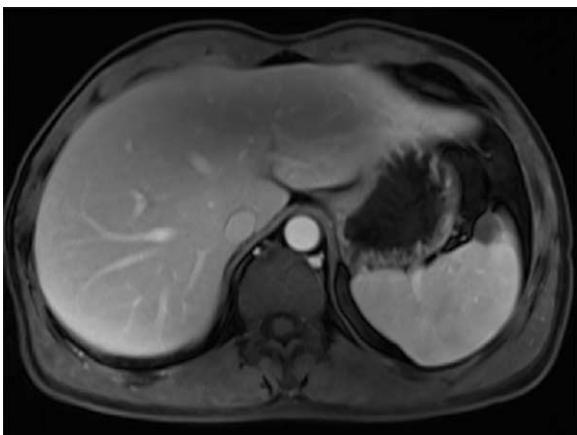


FIGURE 3. Post-contrast T1WI at portal phase 4 months later after treatment. Spleen shrank to normal size, the nodules seen on previous MRI had been absorbed, and infarction in anterior aspect of spleen also reduced.

hypochoic lesions, which are neither characteristic nor specific. In recent years, CT and MRI are becoming good auxiliary examinations to diagnose abdominal diseases within solid organs. However, as for the imaging manifestations of CT or MRI, there were few case reports of splenic involvement associated with VL^{6–8} (Table 1). There were only 3 cases of leishmaniasis reported in English literatures regarding CT findings. Splenomegaly was seen in all 3 cases and multiple small hypodense nodular lesions in 2 cases on post-contrast CT. Multiple splenic nodules with hypoecho on USG or hypodensity on CT are commonly seen in a variety of diseases, such as lymphoma, metastases, hemangiomas, abscesses and granulomatous diseases etc. In 2012, Steven Raeymaeckers et al⁸ first reported the MRI features of a 15-month-old Moroccan girl with lesions of VL in spleen. MRI demonstrated markedly enlarged spleen as well as multiple ill-defined and heterogeneous hypointense nodules on T2WI. However, DWI and dynamic contrast enhanced series were not performed. Multiple hypointense lesions on T2WI are most often seen in case of healed granulomas or infections, or less frequently in case of sarcoidosis, lymphoma, metastasis, and sickle cell disease.¹² Splenic hemangioma appears very high intensity or “bulb” on T2WI, and progressive centripetal enhancement after contrast administration on MRI or CT. Splenic metastases and lymphoma appears high intensity on T2WI, mild enhancement and relatively low intensity comparing with normal splenic parenchyma after contrast administration, and no necrosis, calcification and bleeding in lesions of lymphoma. Sarcoidosis is a systemic disease, often involving the hilus pulmonis and mediastinal lymph nodes and systemic multiple organs.

In our case, CT demonstrated mild splenomegaly and multiple hypodense nodules with faint ring-like enhancement after contrast administration, from which malignant tumors still should be considered. MRI revealed the splenic lesions as multiple nodules with concentric rings on T2WI, no obvious diffusion restriction on DWI and gradually increasing ring-like enhancement, which indicated benign lesions with fibrous tissues, surrounding edema and central necrosis. The characteristics suggested inflammatory granuloma, which could rule out malignant tumors and hemangioma. The repeated diagnostic tests for plasmodium, bacterial abscess and tuberculosis were negative, and parasitic disease then was suspected. By reviewing travel history, and following positive serological leishmania antibody test, the final clinical diagnosis was confirmed splenic involvement of VL. MRI findings in this case contributed to the diagnosis of leishmaniasis. To our knowledge, this is the first case reported a complete MRI examination. The other one report of MRI findings was merely about T2WI without DWI and post-contrast studies.

In conclusion, for patients with long-term unexplained fever, MRI examination may provide more information to help differentiating from lymphoma, and metastasis etc. When MRI demonstrates multiple ring-like lesions on T2WI, with gradually increasing contrast-enhancement, and no restricted diffusion, VL should be considered. Combining MRI features with clinical history, bone marrow biopsy and specific serological antibody test, early clinical diagnosis can be made and timely treatment can be undertaken.

ETHICAL REVIEW AND CONSENT

Ethical approval was obtained from the ethics committee of the Tongde Hospital of Zhejiang Province. Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

TABLE 1. CT and MRI Findings in Literatures and Our Case

	Modality	Imaging findings
Bükte Y	CT	The spleen was huge and contained widespread, joined hypodense nodular lesions
Toqeer M	CT	Splenomegaly only
Raeymaeckers S	CT	Obvious splenomegaly. The parenchyma of the spleen contained numerous hypodense nodules
	MRI	Markedly inhomogeneous intensity of the spleen with multiple ill-defined and heterogeneous hypointense nodules throughout the parenchyma on T2WI
Our case	CT	Mild splenomegaly only on plain scan and multiple hypodense nodular splenic lesions with mild ring-like enhancement with dot of nonenhancement in center after contrast administration
	MRI	Mild splenic enlargement and multiple inhomogeneous parenchymal intensity due to nodules besides infarction. The nodules were demonstrated as concentric multiple rings on T2WI, no obvious diffusion restriction on DWI, and gradually increasing ring-like enhancement after contrast administration

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