

# Imaging Findings in Primary Adrenal Lymphoma: Report of Three Cases: Differential Diagnosis

## Primer Adrenal Lenfoma: Üç Olgunun Sunumu

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**ABSTRACT** Primary adrenal lymphoma (PAL) is a rare neoplastic disease. Most of the patients are elderly men with bilateral adrenal masses with no extra-adrenal involvement. The most common presenting symptoms of patients with PAL are fever, weight loss, lumbar pain and symptoms of adrenal insufficiency. The prognosis of patients with PAL is poor. Many patients with PAL die due to tumor recurrence or severe infections within the first year. The preoperative diagnosis of PAL is still problematic because of its nonspecific clinical presentation and imaging findings. This report presents ultrasonography, computed tomography, magnetic resonance imaging, and positron emission tomography/computed tomography findings of three patients with primary adrenal lymphoma.

**Key Words:** Lymphoma; X-ray computed; magnetic resonance imaging; positron-emission tomography; non-Hodgkin's lymphoma

**ÖZET** Primer adrenal lenfoma (PAL), nadir görülen bir neoplastik hastalıktır. Hastaların çoğu adrenal dışı dokuların müdahil olmadığı bilateral adrenal kitleye sahip yaşlı erkeklerdir. Yüksek ateş, kilo kaybı, bel ağrısı ve adrenal yetmezlik PAL hastalarının başvuruda sık sergilediği semptomlardır. PAL hastalarının prognozu kötüdür. Pek çok PAL hastası tümörün nüksetmesi veya hastalığın ilk yılında oluşan şiddetli enfeksiyonlar yüzünden ölür. Klinik ve görüntüleme bulguları spesifik olmadığı için PAL'ın preoperatif tanısı hâlâ zordur. Bu raporda primer adrenal lenfomalı üç hastanın ultrasonografi, bilgisayarlı tomografi, manyetik rezonans görüntüleme ve pozitron emisyon tomografisi/bilgisayarlı tomografi bulguları sunulmuştur.

**Anahtar Kelimeler:** Lenfoma; bilgisayar tomografisi; manyetik rezonans görüntüleme; pozitron emisyon tomografisi; non-Hodgkin lenfoma

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Secondary involvement of the adrenal gland with non-Hodgkin's lymphoma has been reported to occur in up to 25% of the patients with this disease during the course of the illness. In contrast, PAL is rare. Most of the patients with PAL present with bilateral adrenal masses with no disease involvement elsewhere.<sup>1,2</sup> The preoperative diagnosis of PAL is very difficult because of its rarity, nonspecific clinical presentation and imaging findings. However, it is important to recognize this uncommon entity. This report presents the imaging findings of three patients with an ultimate diagnosis of PAL.

## CASE REPORTS

### CASE 1

A 53-year-old man presented with abdominal pain, fatigue, nausea and weight loss over 5 months. Laboratory tests and a physical examination, which included detailed endocrinological evaluation were unremarkable. Abdominal ultrasonography (US) showed well-defined hypoechoic solid masses in both adrenal glands. Abdominal computed tomography (CT) showed 80×66 mm right and 85×60 mm left mild hypodense soft tissue masses with well-defined margins in the adrenal glands bilaterally (Figure 1). Magnetic resonance imaging (MRI) showed massive bilateral solid adrenal masses with well-defined margins. The masses had low signal intensity on T1-weighted images and heterogeneous slightly high signal intensity on T2-weighted images. Chemical shift opposed-phase MRI did not show any signal intensity changes. On diffusion-weighted imaging (DWI), the masses had homogeneous high signal intensity with low apparent diffusion coefficients (ADC) (Figure 2). Histological examination of an incisional biopsy specimen revealed diffuse B-cell non-Hodgkin's lymphoma. Positron emission tomography (PET) was performed for further staging of the disease and showed intense fluorodeoxyglucose (FDG) uptake in both adrenal masses (Figure 3). There was no abnormal FDG uptake in the rest of the body. The patient was accepted as Stage IV, IPI 2 without B symptoms. He started to



**FIGURE 1:** Contrast-enhanced axial CT examination showing bilateral adrenal masses with well-defined margins and poor enhancement (arrows).

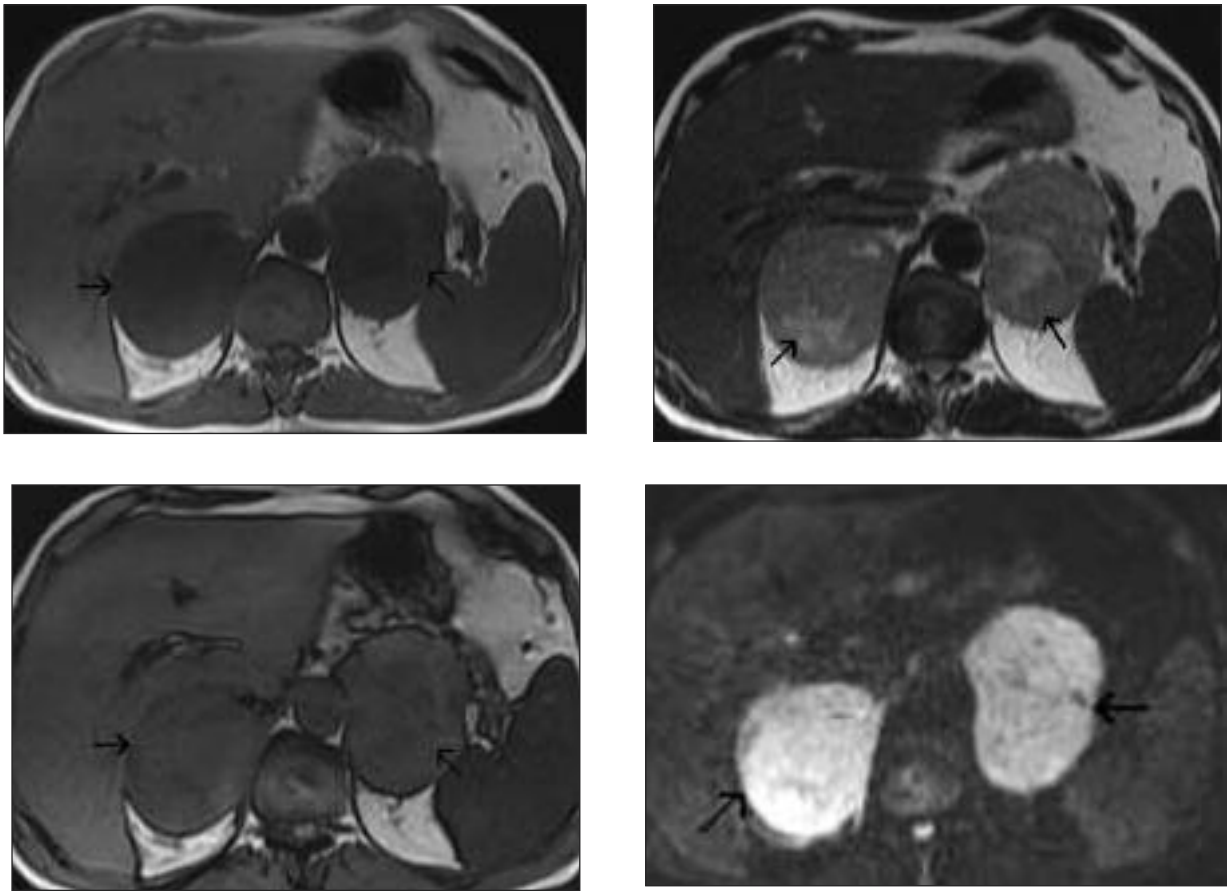
receive R-CHOP regimen, and his symptoms disappeared completely after the first cycle. This case is currently receiving systemic chemotherapy.

### CASE 2

A 66-year-old man admitted to our center with a complaint of pain which was mainly at the lumbar region and increasing day by day for 2 months. His personal history, routine physical examination and laboratory results were unremarkable. His abdominal US obtained at another center had shown a hypo-echoic solid right adrenal mass, so we evaluated this lesion with abdominal CT with contrast enhancement which showed a solid right adrenal mass with a size of 105×85 mm in diameter. The lesion had well-defined margins, homogeneous density and poor enhancement (Figure 4). Hormone secreting tumors of the adrenal gland were excluded with further laboratory and urine examinations. The patient underwent a definitive operation, and the lesion was completely resected. The histopathological diagnosis was diffuse large B-cell non-Hodgkin's lymphoma. The case was accepted as Stage IE, IPI score 1 without B symptoms. He received 8 cycles of R-CHOP regimen, and he was well without any signs of recurrence at the second year of diagnosis.

### CASE 3

A 57-year-old man admitted to our center with complaints of fever and severe fatigue. His personal history, routine physical examination, and laboratory results were unremarkable. Bilateral ovoid hypo echoic solid adrenal masses were determined in an abdominal US and abdominal CT scan showed mildly hypodense masses in the right and left adrenal glands, which sized 68 × 55 mm and 80 × 59 mm, respectively. The lesions were homogeneously enhanced and had smooth lines. Although this case had huge bilateral adrenal masses, his further laboratory and urine examinations failed to determine any hormone excess or adrenal deficiency state. A CT-guided true-cut biopsy was done without any complications and the diagnosis was diffuse large B-cell lymphoma. Unfortunately the case preferred to admit to another center for further management.

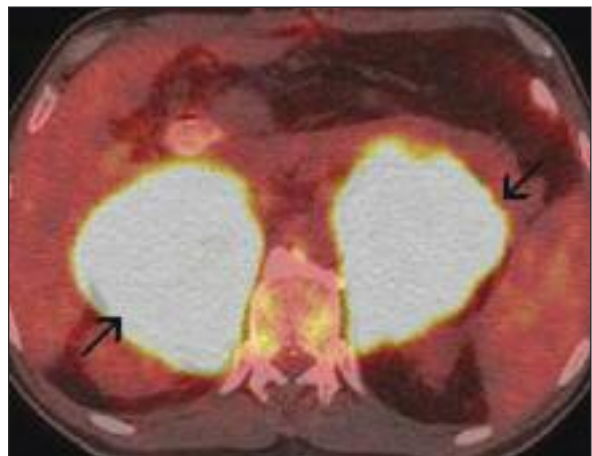


**FIGURE 2:** a-d. MRI of the adrenal masses had low signal intensity on axial T1-weighted image (a). Heterogeneous high signal intensity on axial T2-weighted image (b). Adrenal masses without signal intensity changes on the opposed-phase MRI (c). On diffusion-weighted imaging (DWI), the masses had a homogeneous high signal intensity (arrows) (d).

## DISCUSSION

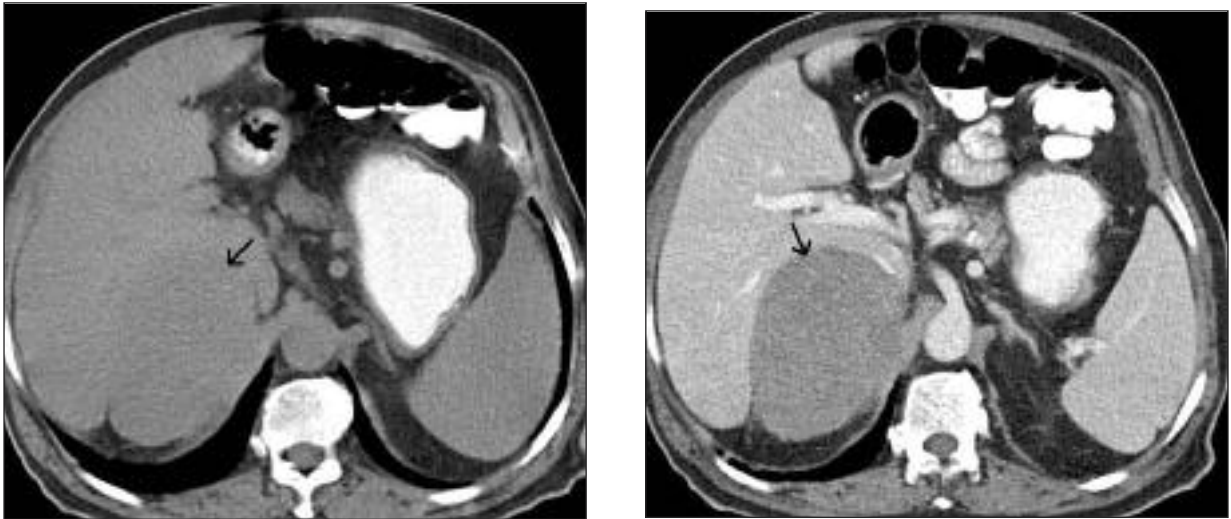
PAL is an extremely rare entity. Only 70 cases have been reported in the English literature.<sup>3</sup> Most of the patients are elderly men with bilateral adrenal masses without any extra-adrenal involvement. Histologically, the most common type of PAL is diffuse large B-cell non-Hodgkin's lymphoma. PAL occurs with a male:female ratio of 3:1 and a median age of 68 (range 39-89) years.<sup>1-3</sup> Nearly 70% of cases with PAL reveal bilateral adrenal involvement with a median maximum diameter of 8 cm (range 4-17) at the time of diagnosis. The most common presenting symptoms are fever, weight loss, lumbar pain and/or symptoms of adrenal insufficiency.<sup>3</sup>

Although imaging modalities are thought to play an important role in establishing the diagno-



**FIGURE 3:** Axial PET-CT fusion image showing intense FDG uptake in the bilateral adrenal masses (arrows).

sis of adrenal masses, it is difficult to establish a correct diagnosis because of the nonspecific findings, especially when there is unilateral involvement or



**FIGURE 4: a-b.** Non-enhanced and postcontrast axial CT shows a homogenous right adrenal mass with well-defined margins and poor enhancement (arrow).

the lesion is small.<sup>2,3</sup> Most patients with PAL have a very poor prognosis, although early diagnosis and treatment prolong the disease-free survival in these patients. The more frequent use and wide availability of US, CT and MRI would identify a greater number of adrenal masses, discovered incidentally. Therefore, it is important to differentiate benign from malignant adrenal masses and diagnose PAL during the early stages of the disease.

CT is considered the most important imaging modality for evaluating adrenal masses. Adrenal lesions with an attenuation value of  $>10$  HU in unenhanced CT or an enhancement washout of  $<50\%$  and a delayed attenuation of  $>35$  HU (on 10-15 min delayed enhanced CT) are possible indicators of malignancy.<sup>2,3</sup> The size of the lesion is another important point for differentiating benign from malignant lesions. Lesions larger than 4 cm in diameter tend to be either metastasis or primary adrenal carcinomas.<sup>2</sup> On CT, PAL tends to appear as complex masses of variable density, due to the presence of hemorrhagic or necrotic foci, although a few patients have homogeneous masses, as in one of our cases. They can also appear as retroperitoneal tumors infiltrating adjacent structures, such as the inferior vena cava, pancreas and kidneys. The enhancement of lymphomas after the administration of intravascular contrast medium is usually low.<sup>1,2</sup>

Primary adrenal lymphoma is reported to appear as low signal intensity on T1-weighted images and high signal intensity on T2-weighted images. MRI can also be used to differentiate benign from malignant lesions by calculating the chemical-shift ratio, a measure of the signal intensity loss between in- and opposed-phase images.<sup>1,2,4</sup> However, taking into consideration only the atypical adenomas, chemical shift MRI is of no diagnostic value. Studies evaluating the contrast wash-out patterns on delayed contrast enhanced MR images showed that adenomas demonstrated moderate enhancement and a quick wash-out, whereas malignant masses showed pronounced enhancement with a remarkably slower washout. There are only few reports with contrast enhanced MR imaging in the early dynamic phase. Adenomas exhibit a capillary blush at the 18th second (immediate contrast enhancement) and a wash-out at the 45th second. On the contrary, 50% of malignant adrenal tumors showed either negligible, or no enhancement at the 18th second, while the other half showed weak enhancement. At the 45th second, malignant adrenal tumors still showed irregular or peripheral enhancement contrary to the adenomas, which have already washed out the contrast. According to their study, on the early (25th second) dynamic MR Images 75% and 20.83% of the adenomas showed homogeneous and punctate enhan-

cement, respectively. On the other hand, 56.25% of the malignant masses showed patchy irregular and 25% showed peripheral enhancement.<sup>5</sup>

Recently, PET/CT has been widely used. Unlike CT and MRI, FDG PET is based on increased glucose metabolism in malignant lesions. PET/CT provides a powerful combination of functional and

attenuation information for characterizing adrenal lesions.<sup>3</sup>

In conclusion, diagnosis of PAL should be considered in patients presenting with unilateral or bilateral huge adrenal malignant masses without nodal involvement in the absence of other malignancies.

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