

Primary lymphoma of the spleen mimicking simple benign cysts: contrast-enhanced ultrasonography and other imaging findings

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Abstract We report on a case of incidentally detected primary splenic lymphoma mimicking simple benign cysts on abdominal ultrasonography. On contrast-enhanced ultrasonography (CEUS), the lesions showed isoenhancement in the arterial phase with progressive washout and marked hypoenhancement in the parenchymal phase. This pattern enabled us to suspect the malignant nature of the disease, thus preventing a dangerous misdiagnosis. Accordingly, further characterization with other imaging studies (computed tomography, magnetic resonance imaging, and positron emission tomography) was pursued based on CEUS and taking into account the patient's clinical picture and medical history. Collectively, imaging data led us to a diagnosis of suspected primary splenic malignancy, most probably lymphoma, which was histologically confirmed on the surgical specimen after splenectomy.

Keywords Primary splenic lymphoma · Cysts · Contrast-enhanced ultrasonography · Ultrasound · Imaging

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Introduction

Primary splenic lymphoma (PSL) is reportedly rare [1], and lymphomas are the most common splenic malignancy. On ultrasonography, lymphoma may mimic a cyst, and therefore accurate characterization of incidental focal “cystic” lesions of the spleen is key [2].

Contrast-enhanced ultrasonography (CEUS) is useful in detecting and characterizing uncommon malignancies [3], notably including focal splenic lesions [4, 5]. Although uncommonly reported in the medical literature, PSL is being increasingly recognized in clinical practice as imaging techniques are refined and as more patients present for radiologic investigations. However, findings at CEUS have been previously described only in a single case report of PSL [6], and most studies focus on CEUS patterns of secondary splenic lymphomas [5]. Given that scant data of this condition evaluated with CEUS are available in the English literature, we report on a case of PSL mimicking simple benign cysts on B-mode and color Doppler ultrasound scanning (US). Based on CEUS findings, further imaging studies were done, eventually leading to diagnostic and therapeutic splenectomy.

Case report

A 73-year-old woman was observed for recent onset of dyspepsia. Her medical history included arthrosis and cholecystectomy. An abdominal US performed 6 years before was normal. Blood cell count, liver tests, serum lactate dehydrogenase, beta-2 microglobulin, and neoplastic markers were normal; hepatitis C virus antibody was negative. Esophagogastroduodenoscopy showed reflux esophagitis, hiatal hernia, and gastritis.

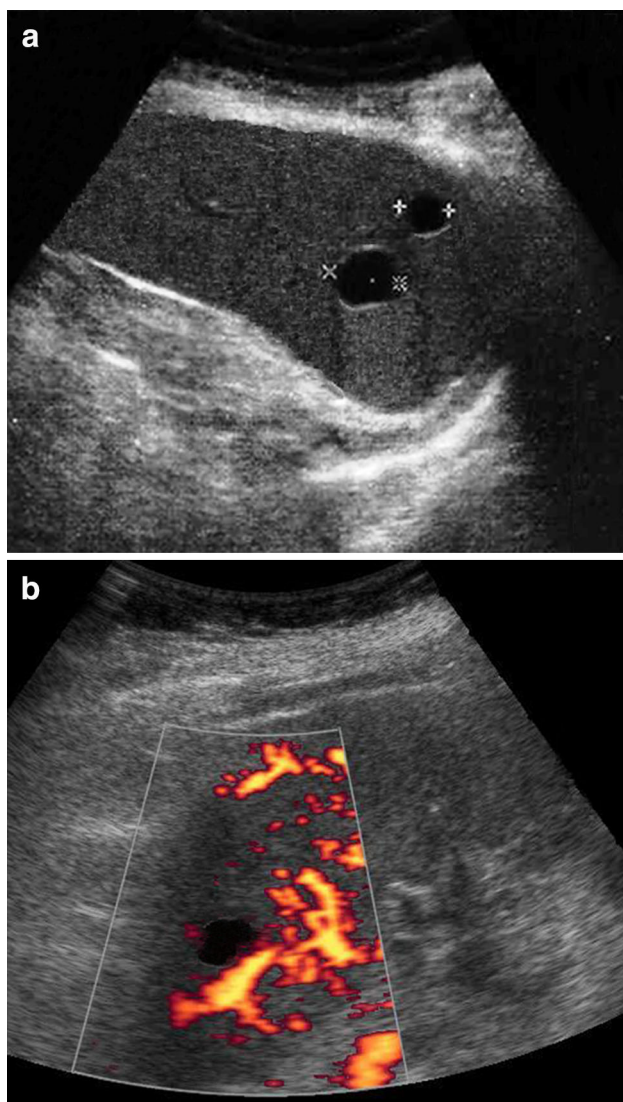


Fig. 1 US findings (left intercostal oblique scans). **a** B-mode US. Two round, anechoic lesions with distinct boundaries, smooth discontinuous thin wall, posterior echo enhancement, and lateral shadowing were found in the upper splenic pole. Spleen size was normal (bipolar diameter 11.8 cm). **b** Power Doppler US. The lesions showed no vascular signals

Abdominal US revealed two small, round, anechoic lesions with well-defined borders, thin discontinuous wall, and posterior echo enhancement in the upper splenic pole (Fig. 1a), which were absent at the abdominal US performed 6 years before. No color and power Doppler signals were detectable within the lesions (Fig. 1b), which made them indistinguishable from simple benign cysts.

However, CEUS [Siemens Sequoia Unit (Siemens SONOLINE Germany) SONOVUE (Bracco, Italy)] showed that the cystic lesions exhibited isoenhancement in the arterial phase with progressive washout and marked hypoenhancement compared to the surrounding tissue in

the parenchymal phase (Fig. 2). Such findings raised the suspicion of the malignant nature of the splenic lesions.

Abdominal contrast-enhanced computed tomography (CECT) scanning disclosed an irregular lesion with ill-defined margins and constant hypodensity in the upper splenic pole (Fig. 3a). No other pathological findings were seen in the abdomen, neck, and chest CECT scanning.

Abdominal magnetic resonance imaging (MRI) showed two splenic lesions (Fig. 3b), which, after gadolinium contrast injection, showed a slow centripetal contrast enhancement.

A total body positron emission tomography (PET) with ^{18}F -fluorodeoxyglucose (^{18}F -FDG) revealed a small hyperactive area in the upper splenic pole, compatible with a portion of the lesion displayed by CT scan.

Taken collectively, the findings of imaging techniques were consistent with a high suspicion of splenic malignancy. Therefore, despite bone marrow biopsy being negative for lymphoproliferative cellular infiltrate, based on such a high suspicion of primary splenic malignancy, most probably lymphoma, the patient was submitted to laparoscopic splenectomy.

On macroscopic inspection, a white tumor 2.5×1 cm in size was identified at the superior splenic pole, surrounded by a hemorrhagic area 3×2 cm in size, in an otherwise normal-sized spleen. The microscopic and immunohistochemical diagnosis was of mature B cell follicular lymphoma, grade 2 out of 3 (Fig. 4).

Given that the lymphoma was limited to the spleen, no adjuvant therapy was performed. The patient remains CT/US-proven disease free 8 years after the diagnosis.

Discussion

On B-mode US, splenic involvement in either primary or secondary lymphoma may present as diffuse micronodular (miliary) infiltration, multiple lesions more than 1 cm in size, a mixture of these appearances, or a single solitary mass that usually appear hypoechoic [1, 5]. Other possible findings include homogeneous splenic enlargement or inhomogeneities of the splenic structure.

Splenic lymphoma may show markedly hypoechoic to anechoic focal lesions with acoustic enhancement, mimicking a splenic cyst on US [2]. The presence of other US cystic-like features, such as well-defined borders and lateral shadowing, is not typical of lymphoma. Ishida et al. have shown that ill-defined borders are a distinctive feature of lymphoma allowing differentiation from splenic cysts [2]. In their study, no cases of lymphoma presented lateral shadowing. Although previously described for large masses [1], a cystic-like presentation of PSL has never been reported before for smaller lesions such as those observed

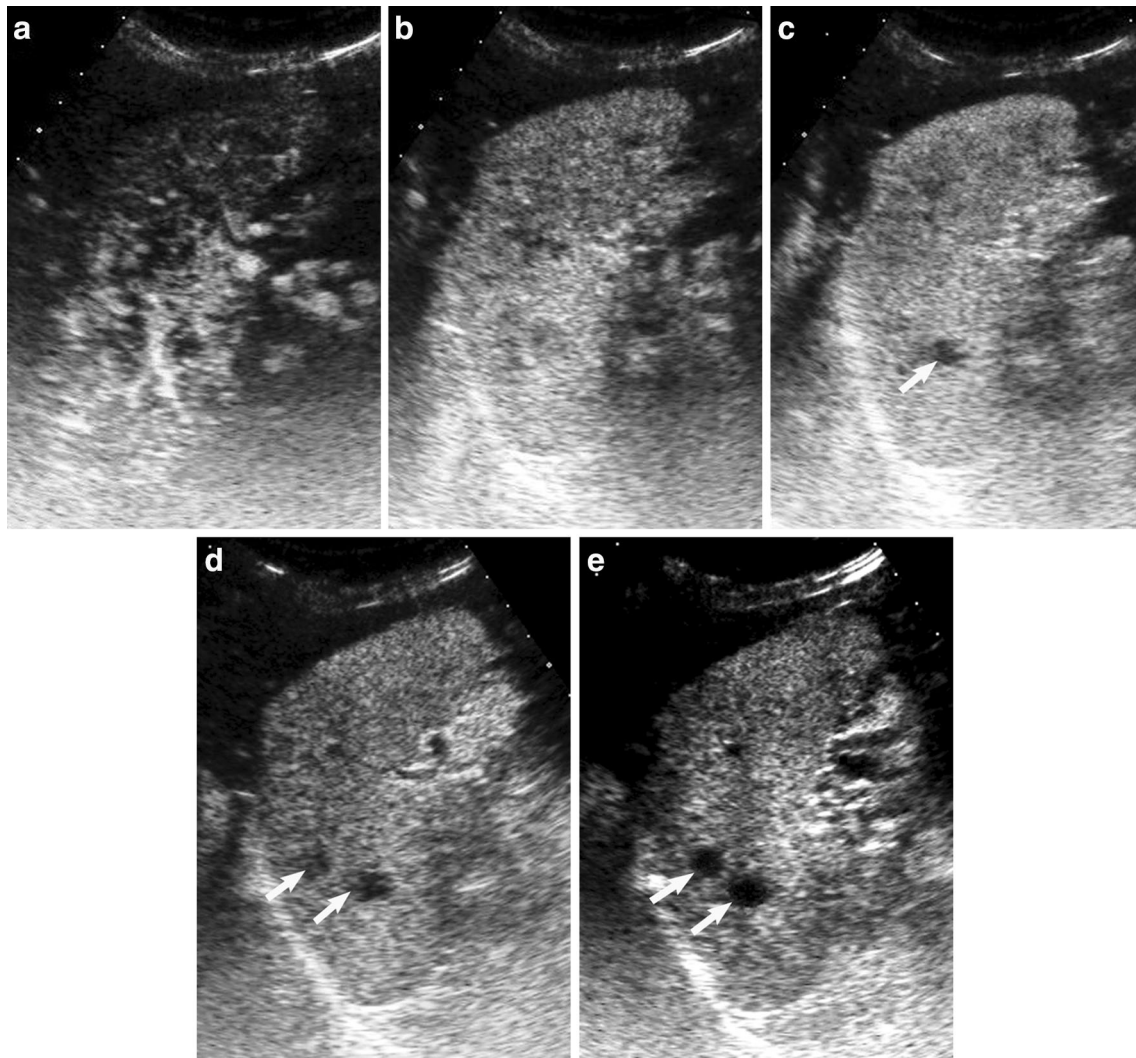


Fig. 2 CEUS findings (left intercostal oblique scans). **a** Arterial phase at 15 s; initially, inhomogeneous parenchymal enhancement, the so-called “zebra pattern.” Splenic lesions are isoechoic compared to the surrounding parenchyma. **b** Arterial phase at 20 s. Splenic lesions are isoechoic compared to the surrounding parenchyma.

c Parenchymal phase at 35 s. Hypoechoic of the bigger lesion (*arrow*). **d, e** Parenchymal phase at 90 and 120 s, respectively. The two lesions (*arrows*) show a progressive hypoechoic, which is marked at 120 s. Arterial phase, 5–30 s; parenchymal phase, 30–300 s

in the present case. In summary, in our case the splenic lesions displayed all the typical ultrasonographic features of simple splenic cysts including well-defined borders at variance with ill-defined ones typical of lymphoma.

Moreover, color and power Doppler US did not show any intralesional vascular signals mimicking benign splenic cysts. However, the medical history was against congenital, post-traumatic and echinococcus cysts, hematoma, and splenic abscess. Therefore, CEUS was performed as an aid in differentiating benign from malignant splenic lesions [4, 5]. The combination of contrast enhancement in the early phase followed by progressive hypoechoic in the parenchymal phase observed in our patient was, indeed, typical for malignant lesions [3–5].

A clear-cut correlation between histological and US cystic findings of this case of PSL is impossible to establish. Lymphomas tend to grow in the absence of well-defined fibrous septa. This homogeneous histological structure provides very few interfaces to generate internal echoes, which can account for the anechoic pattern of the lymphoma nodule [2]. However, the reason(s) why in our case the lesion displayed well-defined borders remains unclear.

The CEUS pattern of lymphoma has been described almost exclusively in secondary splenic involvement. In the arterial phase of CEUS, such a condition has shown isoechoic in 37.5–46.35 % of cases, moderate hypoechoic in 50–53 %, and hyperenhancement in

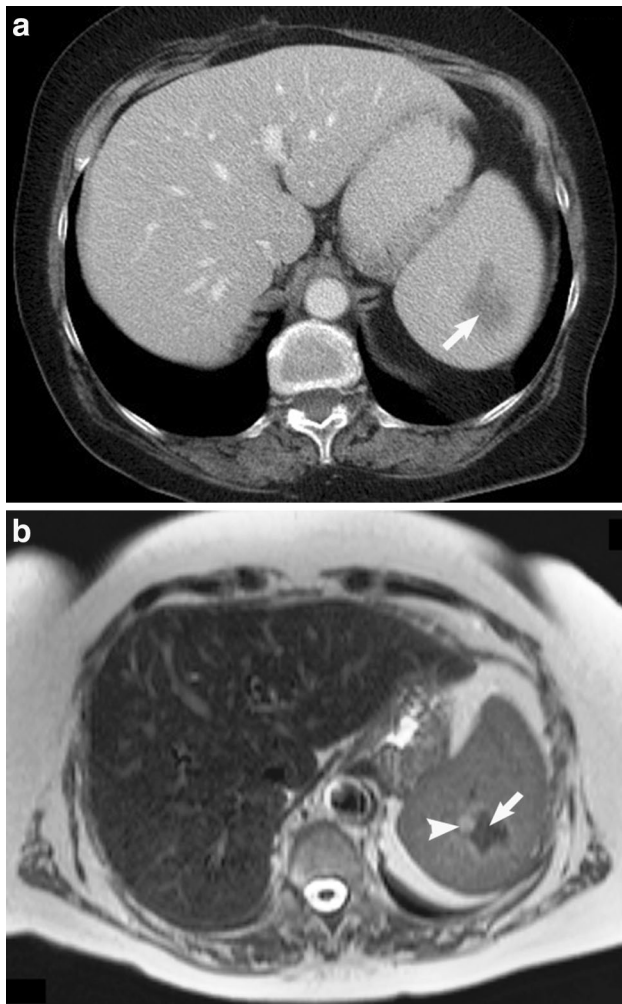


Fig. 3 CT and MRI findings. **a** Abdominal CECT at the venous phase. Normal-sized spleen with a hypodense area (3×3.7 cm) (*arrow*) featuring irregular morphology and ill-defined borders located at the superior splenic pole (the lesion did not show any contrast enhancement in all CECT phases). **b** Abdominal T2-weighted images (WI) MRI. Normal-sized spleen with two adjacent splenic lesions: one (2.4 cm) (*arrow*) hypointense (as well as in T1-WI) and the other one (1.2 cm) (*arrow head*) hyperintense (vs isointense in T1-WI)

only 12.5 % compared to the surrounding parenchyma [5]. In the parenchymal phase, there is a marked hypoenhancement after only 60 s in 100 % of cases due to rapid washout [5].

In our case of PSL, the CEUS pattern was the same as that reported by Sutherland et al. [6] for PSL and was compatible with one of those described in secondary splenic lymphoma in previous studies [5]. However, the CEUS pattern of lymphoma is not specific, overlapping that of metastasis, which can also have a hypoechoic or cystic-like appearance on B-mode US [5].

CEUS, CT, MRI, and PET all have limited specificity for both diffuse and focal splenic lymphoma [1]. However, the patient's medical history, together with imaging studies

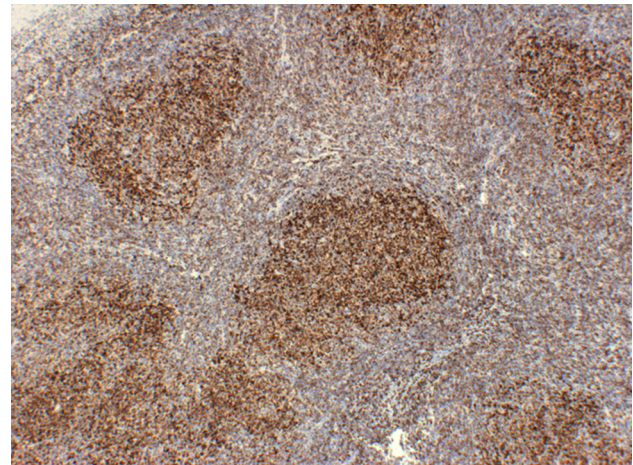


Fig. 4 Histological appearance (Bcl-2 staining, 4x). Lymphoproliferative lesion with a nodular architecture surrounded by isolated intraparenchymal hemorrhages with siderin deposits. On immunohistochemical characterization, the lesion was positive for CD20/126; negative for CD3, CD5, and cyclin D1; weakly positive for CD10; and positive for Bcl-6 and Bcl-2. Cytoproliferative activity (Mib-1) was mild to moderate (about 25 %). The number of centroblasts was more than 5 per high-power field (HPF), but did not exceed 15 per HPF. Splenic hilum lymph nodes showed reactive inflammatory changes without any lymphoma involvement

ruling out lesions in other organs or significant lymph node enlargement, was against a widespread neoplasm or a systemic lymphoma with splenic involvement. Therefore, we suspected a primary splenic malignancy, most probably PSL, which was indeed confirmed histologically.

Conclusion

PSL may have a falsely reassuring presentation with simple benign cyst-like changes that, however, CEUS was able to correctly identify as malignant, promptly leading to diagnostic and therapeutic splenectomy.

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Conflict of interest The authors declare that there are no conflicts of interest.

Ethical statement This article does not contain any studies with human or animal subjects performed by any of the authors.

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