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Splenic Hamartoma: A Case Series

Tirotta D*[1], Lena C[2] and Muratori P[2]

[1]Morgagni Pierantoni Hospital, Internal Medicine, Italy

[2]Morgagni Pierantoni Hospital, Internal Medicine, S Orola University, Bologna, Italy

***Corresponding author:**

Daniela Tirotta,
Morgagni Pierantoni Hospital, Internal Medicine, Italy

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1. **Abstract**

Hamartomas are rare and benign tumors of the spleen. Most patients are asymptomatic and splenic hamartomas are usually incidentalomas. The common clinical manifestations are splenomegaly, spontaneous rupture, anemia, thrombocytopenia and digestive symptoms (loss of appetite and abdominal pain). It affects all age, mostly the elderly peoples. The literature shows a strong association between splenic hamartoma and hematologic and solid malignancies (especially squamous cell carcinoma, renal cell carcinoma, and thymoma) , so when a splenic mass is detected especially in a patient with known malignancy, differential diagnosis is very important . For the same reason, the diagnosis of hamartoma in healthy people, needs to follow-up in order to monitoring possible association with neoplastic diseases. In this context CEUS is a promising, cost-effective modality , because it shows 3 characteristic features of splenic hamartomas (hypervascularity, heterogeneity, reticuloendothelial system detection) . We described a series of cases of splenic lesions in which the use of CEUS shows typical aspects of hamartomas, observed consecutively in our internal ultrasound clinic in 2023.

2. Introduction

The European Federation of Societies for Ultrasound in Medicine and Biology (EFSUMB) Guidelines and Recommendations on the Clinical Practice of Contrast-enhanced Ultrasound (CEUS), updated in 2017, recommend several indications where CEUS may be utilized in the study of the spleen(1): 1. To characterize splenic parenchymal inhomogeneity or suspected lesions on conventional ultrasonology (US); 2. To confirm suspected splenic infarction; 3. To characterize accessory spleens or splenosis; 4. To detect splenic malignant lesions in oncologic patients when Computer to Tomography (CT) and/or Magnetic Resonance Imaging (MRI) and positron emission tomography (PET) are contraindicated or inconclusive; 5. To evaluate the spleen of selected patients following trauma. Hamartomas are rare and benign tumors of the spleen. Most patients are asymptomatic, and splenic hamartomas are usually incidentalomas. The common clinical manifestations are splenomegaly, spontaneous rupture, anemia, thrombocytopenia and digestive tract symptoms (loss of appetite and abdominal pain). Hamartomas are solitary or multiple lesions unencapsulated, compressing the adjacent normal splenic parenchyma (median size 5 cm, maximum 20 cm) (2–4). They affects people of all ages, mostly elderly people. The literature shows a strong association between splenic hamartoma and hematologic and solid malignancies (especially squamous cell carcinoma, renal cell carcinoma, and thymoma) [2–4]; therefore, when a splenic mass is detected, especially in patients with known malignancies, differential diagnosis is highly important (3). For the same reason, the diagnosis of hamartoma in healthy people requires follow-up to monitor for possible associations with neoplastic diseases. In this context, CEUS is a promising, cost-effective modality, because it shows 3 characteristic features of splenic hamartomas (hypervascularity, heterogeneity and reticuloendothelial system detection) (RES detection).

3. Methods

We described a series of cases of splenic lesions in which the use of CEUS (ultrasound scan performed with Esaote Mylab X pro 80 ultrasound system, Contrast used Sonovue) showed typical aspects of hamartomas observed consecutively in our internal ultrasound clinic in 2023 (Table 1).

Table 1: Splenic hamartomas observed in 2023 at our Internal Medicine Institute

Case, Sex, Age	Malignancy	Single/Multiple Lesions	Blood Count Alterations	US Imaging	Doppler US	CEUS Imaging	TC Imaging	MRI Imaging
Case 1, 81-year-old man	Renal cell carcinoma, previous intestinal and gastric polyps	Multiple lesions (max 5 cm)	Moderate thrombocytopenia and anemia	Heterogeneity: No	Heterogeneity: No	Heterogeneity: Yes, central	Heterogeneity: No	Heterogeneity: Yes
				Hypervascularity: No	Hypervascularity: No	Hypervascularity: Yes	Hypervascularity: Yes	Hypervascularity: Yes
				RES detection: No	RES detection: No	RES detection: Yes	RES detection: Yes	RES detection: Yes
Case 2, 75-year-old man	None	Multiple small lesions (max 27 mm)	None	Heterogeneity: Yes	Heterogeneity: Yes	Heterogeneity: Yes	Heterogeneity: Yes	Not performed
				Hypervascularity: No	Hypervascularity: No	Hypervascularity: Yes	Hypervascularity: Yes	
				RES detection: No	RES detection: No	RES detection: Yes	RES detection: Yes	
Case 3, 63-year-old woman	None	Single lesion (> 220 mm)	None	Heterogeneity: Yes	Heterogeneity: Yes	Heterogeneity: Yes	Heterogeneity: Yes	Not performed
				Hypervascularity: No	Hypervascularity: No	Hypervascularity: No	Hypervascularity: No	
				RES detection: No	RES detection: No	RES detection: No	RES detection: No	
Case 4, 94-year-old woman	Chronic myelodysplasia, previous mastectomy for carcinoma	Single lesion (30 x 24 mm)	Bicytopenia	Heterogeneity: Yes	Heterogeneity: Yes	Heterogeneity: Yes	Heterogeneity: Yes	Not performed
				Hypervascularity: No	Hypervascularity: No	Hypervascularity: Yes	Hypervascularity: Yes	
				RES detection: No	RES detection: No	RES detection: Yes	RES detection: Yes	
Case 5, 35-year-old man	Autoimmune hemolytic anemia	Single voluminous lesion	Only anemia	Heterogeneity: Yes	Heterogeneity: Yes	Heterogeneity: Yes	Not performed	Not performed
				Hypervascularity: No	Hypervascularity: No	Hypervascularity: Yes		
				RES detection: No	RES detection: No	RES detection: Yes		
Case 6, 42-year-old man	None	Single lesion (18 mm)	None	Heterogeneity: Yes	Heterogeneity: Yes	Heterogeneity: Yes	Not performed	Not performed
				Hypervascularity: No	Hypervascularity: No	Hypervascularity: Yes		
				RES detection: No	RES detection: No	RES detection: Yes		

4. Results

We observed 6 patients in 2023.

4.1. Patient 1. Multiple hamartomas and kidney

The first patient was an 81-year-old man with splenomegaly associated with multiple anechoic areas in US b mode and disomogenous hypervascularity. Tests revealed moderate thrombocytopenia and anemia (PLT 100’000/mmc, Hb 9.2 g/dl, MCV 93), and a minute right kidney neoformation (1.5 cm) was detected by abdominal US. In anamnesis, the patient had previous intestinal and gastric polyps. The diagnostic hypothesis for the splenic lesions was hematological malignancy (es. lymphoma with splenic localization), secondary neoplastic lesions (metastasis), or benign lesions, such as hamartomas. The patient underwent blood transfusions and diagnostic assessments, such as abdominal CT, which confirmed splenomegaly with multiple hypodense and confluent lesions, suspicious for heteroplasia; images also showed an exophytic lesion of the right kidney with internal vascularization suspicious for neoplastic nature; FDG-PET showed no pathological uptake; and endoscopic examinations (gastroscopy, colonoscopy, wireless endoscopy) revealed multiple red-spots in the proximal small bowel due to punctiform erosions and multiple blood clots of colic traits. CEUS focused on the splenic parenchyma, revealed a radial centrifugal pattern wash-in in the arterial phase with heterogeneity due to the presence of multiple anechoic cystic areas and poor in the venous phase, leading to the diagnosis of hamartoma, which was confirmed by MRI (lesions with low signal in T1W, and non-homogeneous lesions in long TR sequences due to the presence of both fluid and fibrotic components). The patient underwent kidney resection and subsequent US follow-up of the hamartoma. (Figure. 1.1, 1.2, 1.3)

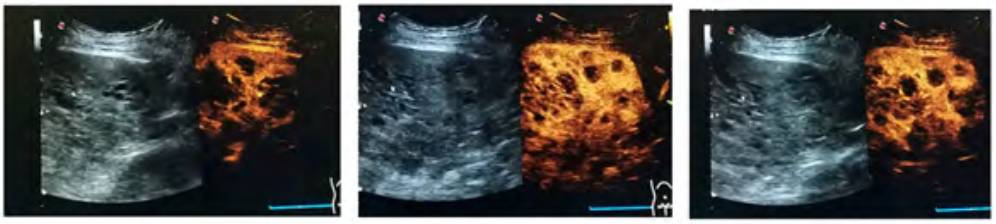

Figure 1: Multiple hamartomas , patient 1. Spleen CEUS at 0 seconds , 30 seconds, 3 minutes. Radial centrifugal pattern wash-in in the arterial phase with heterogeneity due to the presence of multiple anechoic cystic areas, and poor wash-out in the venous phase.

4.2. Patient 2. Multiple hamartomas of the spleen (incidentalomas).

The second patient was a 75-year-old man with fever and abdominal pain associated with acute renal impairment, neutrophilic leucocytosis and elevated inflammatory indices. Abdominal US revealed disomogeneous spleen and suspected hydronephrosis of the left kidney, which was confirmed by CT (showing unilateral left urolithiasis and multiple splenic hypodense nodular f of the spleen, which tended to homogenize in the late phase, possibly due to an angiomatous nature). Doppler US showed hypervascularity of the spleen lesions, finally CEUS disomogeneous wash-in in the arterial phase and poor attenuation in the venous phase of the lesions. Urinary infection and urinary lithiasis were treated, and US follow-up of the splenic lesions was performed. (Figure. 2.1, 2.2, 2.3)

4.3. Patient 3. Single hamartoma (incidentaloma).

The third patient was a 63-year-old woman with fever and abdominal pain on the right side, suggesting renal involvement due to an infection of the urinary tract caused by Escherichia Coli. Abdominal CT confirmed the diagnosis of pyelonephritis and revealed moderate splenomegaly associated with multiple anechoic areas, unlikely to be angiomatous, with disomogeneous hypervascularity. Therefore, the patient underwent CEUS, which revealed enhancement in the arterial phase, which does not include the anechoic areas and which remains isovascular to the surrounding parenchyma in all phases, without washout but with better definition in the late phase, for the avascular areolas; these aspects led to the diagnosis of hamartoma. The urinary infection was treated and abdominal US follow-up of the splenic lesions was performed. (Figure. 3.1, 3.2, 3.3)

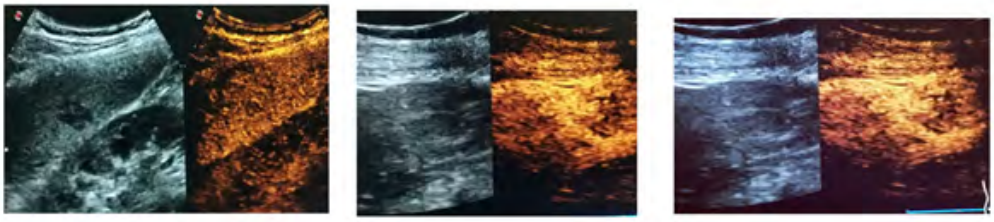

Figure 2: Multiple hamartomas, patient 2. Spleen CEUS at 0, 30 seconds, 3 minutes. Dishomogeneous wash-in in the arterial phase and poor attenuation in the venous phase of the lesions.

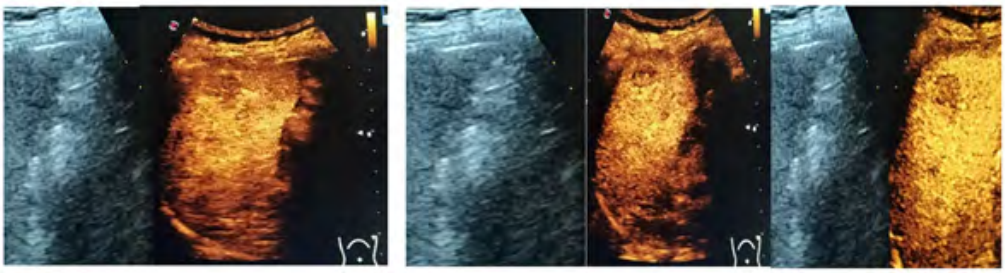

Figure 3: Single hamartomas , patient 3. Spleen CEUS at 0 seconds,30 seconds, 3 minutes. Enhancement in the arterial phase, which does not include the anechoic areas and which remains isovascular to the surrounding parenchyma in all phases, without wash-out.

4.4. Patient 4. Single hamartoma in chronic myelodysplasia.

The next patient was a 94-year-old woman with asthenia and ecchimosys, associated with mild pancytopenia (Hb 10 g/dl, NCV 92, WBC 368,000/mmc), likely related to chronic myelodysplasia and deficiency of vitamin B-12. In anamnesis, she underwent previous mastectomy for carcinoma. Abdominal US revealed a dishomogeneous spleen with hypervascularity. CEUS revealed intense wash-in in the arterial phase and mild rapid wash-out in the venous phase, compatible with hamartoma. US follow-up of the splenic lesions was performed. (Figure. 4.1, 4.2, 4.3)

4.5. Patient 5. Single hamartoma in autoimmune hemolytic anemia.

The next patient was an 85-year-old man hospitalized for autoimmune hemolytic anemia (Hb 7.3 g/dl, MCV 108). The patient had a history of usual interstitial pneumonia and previous peristernal squamous cell carcinoma. Abdominal US revealed an increased spleen volume (area 75 cm2) with homogeneous echostructure, except for the presence of a large hyperechoic lesion measuring 58 × 57 mm, with central stellate vascularization on Doppler. After administration of MDC (Sonovue 1/2 f ev), rapid centrifugal wash-in of the splenic lesion was observed in the arterial phase, after the second minute, with slight attenuation and no real wash-out. The patient underwent US follow-up. (Figure. 5.1, 5.2, 5.3)

4.6. Patient 6. Single hamartoma of the spleen (incidentaloma).

The latest case involved a splenic incidentaloma in a man with no blood count changes and currently no known associated malignancies. Doppler US revealed central vascularization with a low resistance index. After administration of MDC (Sonovue 1/2 f ev), CEUS revealed rapid centrifugal wash-in of the splenic lesion in the arterial phase and slight attenuation after the second minute, without real wash-out. The patient underwent US follow-up (Figure. 6.1, 6.2, 6.3).

5. Conclusion

In our case series, splenic hamartomas were prevalent in men of advanced age. Radiologically, on ultrasound, most hamartomas appear as hyperechoic solid lesions associated with hypervascularity on Doppler studies. On CT, hamartomas are well-defined, isodense/hypodense lesions. These lesions are usually enhanced heterogeneously. Cystic lesions and calcifications due to ischemia or hemorrhage may be present. MRI variability is due to the composition of the lesion: fibrous vs nonfibrous. Most lesions are isointense on T1- weighted images and heterogeneously hyperintense on T2-weighted images. PET was used in one patient but only to demonstrate a lack of uptake. The clinical diagnosis of hamartoma is highly important due to the possible association with solid or hematological neoplasms, which require follow-up. However, differential diagnosis is often difficult and requires heavy imaging methods. In all our cases, CEUS, a real-time method focused on the splenic parenchyma, showed good positive predictive value for the diagnosis of hamartoma. and allows us to avoid invasive methods. However other studies are needed to evaluate the efficacy of CEUS compared to second level imaging.

6. Declarations

The study was approved by the Research Ethics Committee of AUSL Romagna (approval number 152, 24/01/2024). Written informed consent was obtained from each patient.

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