Uncommon splenic pathology. Study with MDCT

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Learning objectives

Multislice CT is the modality of reference for the study of upper abdominal pathology. The spleen presents many diseases, many of which we see often in our practice: ischemic pathology, hematology, congenital anomalies (accessory spleens) trauma, etc. But there are other less common disease processes that affect the body than CT especially the variety multislice can prove and that we must consider when evaluating this organ.

The main goal is to learn to look at the spleen as an organ capable of many different processes, thereby extending our mind when assessing the possible pathology that affects it.
Background

Direct visualization of suspected splenic disease with various imaging modalities has always been a challenge to the radiologist. Splenic lesions tend to be small or infiltrating, and without use of an organ-specific contrast agent, they tend to be difficult to detect.

CT attenuation of splenic tissue is homogeneous, typically measuring 40-60 HU on noncontrast material-enhanced scans. Splenic attenuation is normally 5-10 HU less than that of liver, a standard of reference used in evaluation of either hepatic or splenic disease.

The spleen is optimally evaluated with use of intravenous contrast material. The spleen normally demonstrates heterogeneous enhancement, especially during the parenchymal phase of opacification.

One must be cautious and avoid misinterpretation of this early heterogeneity for focal splenic disease.
We present several cases of rare splenic diseases, diagnosed in our department with CT, which include torsion of pedicle in a migratory spleen, presenting as an acute abdomen, asplenia-polysplenia syndromes, splenosis, splenic subcapsular hematoma associated to chronic pancreatitis, metastasis, splenic artery aneurysm and hamartoma. We discuss the presentation, method of study, differential diagnosis and diagnostic clues from them.

CASE 1: SPLENIC TORSION IN PACIENT WITH WANDERING SPLEEN

Wandering spleen is a rare clinical condition, cause of acute or chronic abdominal pain, with an incidence of less than 0.2%, in which the spleen is devoid of its normal peritoneal attachment associated with a long vascular pedicle. Women between the ages of 20-40 years are more likely affected.

The spleen is excessively mobile and displaced from its normal position in the left hypochondrium which favors torsion and ectopic site (spleen wandering), migrating inferiorly, intraperitoneal location in most cases.

Our case was a patient with acute abdomen, underwent CT, which found an enlarged spleen, low location Fig. 1 on page 8 Fig. 2 on page 8, with torsion of its pedicle Fig. 3 on page 9 Fig. 4 on page 10 and important vascular compromise. Emergency surgery was performed with splenectomy, which confirmed the diagnosis. Fig. 5 on page 11 Fig. 6 on page 12

CASE 2: SPLENOSIS

Splenosis is a rare entity described in 1937 by Shaw and Shafi and defined as the implantation of splenic tissue, functionally active, heterotopic after splenectomy total or partial, traumatic or not, and mainly on serosal peritoneal cavity. This is a different concept to the ectopia of splenic tissue, whose base etiopathogenic are alterations in the development embryological (spleenogonadal merger or accessory spleen).

This is an active splenic tissue so it can grow, regress or submit certain protective immune function about the patient. The onset of clinical manifestations, if present, can range from 5 months to 36 years after splenectomy.
The mean interval, reported in the literature, including splenectomy and diagnosing splenosis is 18.8 years.

Our case is a patient with a personal history of splenectomy and total gastrectomy for gastric cancer over 11 years ago, in control ultrasound detects at least one image in the left upper quadrant that corresponds to the spleen of 3.7 cm, Fig. 7 on page 13 well defined and homogeneous echogenicity similar to spleen, differential diagnoses are given as accessory spleen (which has grown after splenectomy) or splenosis, complete CT study Fig. 8 on page 14 where shows 2-3 images with similar density that spleen, some very attached to pancreatic tail which is also considered the possibility of metastasis of pancreatic tail as differential diagnosis. The following CT controls are stable, is compatible with splenosis.

CASE 3 and 4: HETEROTAXY SYNDROME WITH POLYSPLENIA.
Situs ambiguous or heterotaxy is a visceral malposition and dysmorphism associated with indeterminate atrial arrangement.
It may present with asplenia or polysplenia.
It is rare and a diagnostic challenge to radiologists because of the overlapping spectrum of findings. It is important to remember that these patients should discard congenital heart disease (occurring in up to 75% of cases).
We report two cases of polysplenia:
1-The first case was a 43 year old man with chronic diarrhea syndrome, detected at CT performed the following findings:
Polysplenia right upper quadrant and right- sided stomach (always ipsilateral), midline liver and gallbladder, intestinal malrotation of the bowel, truncated pancreas and left-sided inferior vena cava with levocardia. Fig. 9 on page 15 Fig. 10 on page 16 Fig. 11 on page 17 Fig. 12 on page 18
2-61 years old woman, with acute pancreatitis. CT: truncated pancreas shows signs of pancreatitis, polysplenia left hypochondrium with liver, gallbladder and stomach in normal position, intestinal malrotation, interruption inferior vena cava with azygos-hemiázigos continuation, also associated with mesocardia and bilateral bilobed lungs. Fig. 13 on page 19 Fig. 14 on page 20 Fig. 15 on page 21 Fig. 16 on page 22 Fig. 17 on page 23

CASE 5: SPLENIC SUBCAPSULAR HEMATOMA ASSOCIATED WITH CHRONIC PANCREATITIS.
41 year old man with alcoholic habit with known chronic pancreatitis, with a history of pancreatic pseudocysts, having left upper quadrant pain of 10 days duration, CT were performed with and without contrast, multiphase, where splenic subcapsular hematoma observed 6x9x11 cm, with different densities and without active bleeding. Also adjacent
to the spleen, subphrenic location, there is a 5 cm pancreatic pseudocyst. Fig. 18 on page 24 Fig. 19 on page 25 Fig. 20 on page 26
Spleen Bleeding complications are less common in chronic pancreatitis. Although the incidence is not known today, in a recent series of 500 patients, reported an estimated prevalence of 0.4%. In the past, the pathogenesis of these complications was mainly associated with pancreatic pseudocyst. We have found no cases associated pseudocysts. Several case reports have demonstrated that dissection of pancreatic pseudocyst in the splenic hilum can lead to infarction, hemorrhage and ruptured spleen. It was believed that direct contiguity of the tail of the pancreas and the splenic hilum, in the absence of peritoneal division, provided a door for inflammatory extension. Due to the close proximity of the splenic vessels, the erosion of the splenic artery and splenic vein congestion in addition to the development of bleeding complications.

CASE 6: SPLENIC METASTASIS
Splenic metastases are relatively infrequent, are only 7% of patients with concomitant malignancy. The 50% are of melanoma and the rest by adenocarcinomas of different origins (breast, lung, colon, ovarian, endometrial and prostate).
Our case is a 32 year old woman with vulvar melanoma diagnosed one year ago, in CT control multiple lesions observed in liver and spleen of new onset metastasis. Fig. 21 on page 27

CASE 7: SPLENIC ARTERY ANEURYSM
Patient 51 years old, who was abdominal ultrasound, there is a chance finding anechoic image left upper quadrant adjacent to the spleen with turbulent flow within, suggestive of splenic artery aneurysm Fig. 22 on page 28. Abdominal CT scan is performed without contrast and CT angiography to complete study which confirms aneurysm in distal splenic artery, with a maximum diameter of 37 mm and partially calcified wall. Fig. 23 on page 29 Fig. 24 on page 29 Fig. 25 on page 30

CASE 8: SOLITARY SPLENIC MASS
The finding of a solitary splenic mass solid differential diagnosis must be made with hemangioma (most common benign tumor), lymphoma (most common malignant lesion) and other unusual tumors such as hamartoma, and metastatic angiosarcoma.
Our case is a patient with no history of interest in abdominal ultrasound reveal splenomegaly of 13 cm, and a splenic solid mass measuring about 5 cm, isoechoica, regular edge, with peripheral displacement of vascularization Fig. 26 on page 31.

It comes complete with CT and MRI study. In abdominal CT Fig. 27 on page 32, the lesion is not visible in the study without contrast, has peripheral vessels in the arterial phase without clear uptake, and hypodense and ill-defined in portal phase. Isodense is made with the remainder of the parenchyma in the late phase and causes no apparent disturbance spleen contour.
MR imaging demonstrate a partially defined mass, rounded, isointensity on T1-weighted images and high intensity on T2-weighted images. Fig. 28 on page 33.

After administration of contrast material (dynamic study FAME) has a peripheral uptake in early arterial phase (peripheral vasculature), then displays a central lower uptake, which is made isointense with respect to splenic parenchyma in deferred phases. Prolonged enhancement may be appreciated.

Imaging findings suggest splenic hamartoma Fig. 29 on page 34

The lesion was an incidental finding and remains stable, which leads us to the hamartoma.

Hamartoma of the spleen is a rare benign tumor without sex predilection, characteristically composed of anomalous mixtures of normal elements of splenic tissue.

In most cases the radiological findings do not allow a specific diagnosis.
**Fig. 1:** Axial CT. **SPLENIC TORSION IN PATIENT WITH WANDERING SPLEEN.** Abdominal mass with characteristics suggestive of ectopic spleen (enlarged) and an absence of spleen in the normal position.

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Fig. 2: Axial CT with contrast. SPLENIC TORSION IN PATIENT WITH WANDERING SPLEEN. Splenic infarction (no enhancement) caused by torsion of the splenic pedicle.

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Fig. 3: Axial CT. SPLENIC TORSION IN PATIENT WITH WANDERING SPLEEN. Swirl image of splenic pedicle.
**Fig. 4:** Axial CT. SPLENIC TORSION IN PATIENT WITH WANDERING SPLEEN. Swirl image of splenic pedicle.

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**Fig. 5:** SURGICAL FIELD Splenic congestion and torsion of the splenic pedicle.

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Fig. 6: SURGICAL SPECIMEN: enlarged spleen with areas of infarction.

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**Fig. 7:** SPLENOSIS. Ultrasound in left hipocondrium, Abdominal mass 3.7 cm, with echo characteristics like spleen.

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Fig. 8: Axial MDCT with contrast. SPLENOSIS.

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Fig. 9: Axial MDCT with contrast. HETEROTAXY SYNDROME WITH POLYSPLENIA in a 43 years old man. Multiple spleens in right upper quadrant and right-sided stomach (always ipsilateral). Midline liver (predominantly left-sided).

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**Fig. 10:** Axial MDCT with contrast. HETEROTAXY SYNDROME WITH POLYSPLENIA in a 43 years old man. Left inferior vena cava, and malrotation (right sided small bowel and left-sided colon)

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Fig. 11: Axial MDCT with contrast. HETEROTAXY SYNDROME WITH POLYSPLENIA in a 43 years old man. Midline gallbladder and truncated pancreas.

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Fig. 12: Coronal MDCT with contrast. HETEROTAXY SYNDROME WITH POLYSPLENIA in a 43 years old man. Midline liver, stomach and small intestine to the right (oral contrast), left-sided inferior vena cava. Levocardia.

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**Fig. 13:** Coronal MDCT with contrast. HETEROTAXY SYNDROME WITH POLYSPLENIA in a 61 years old woman. Shows multiple splenules on the left. Normal position of the liver.

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Fig. 14: Coronal MDCT with contrast. HETEROTAXY SYNDROME WITH POLYSPLENIA in a 61 years old woman. Intestinal malrotation (cecum are located on the left, small bowel on the right), normal location liver and stomach. Pancreatitis signs.

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**Fig. 15:** Axial MDCT with contrast. HETEROTAXY SYNDROME WITH POLYSPLENIA in a 61 years old woman. Multiple splenules on the left side. Normal position of the liver, gallbladder and stomach.

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Fig. 16: Axial MDCT with contrast. HETEROTAXY SYNDROME WITH POLYSPLENIA in a 61 years old woman. Multiple splenules on the left side. Normal position of the liver, gallbladder and stomach. Pancreatitis signs. Interruption of the inferior vena cava with azygous and hemiazygous continuation.

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**Fig. 17:** Axial MDCT of the chest (lung windows) with contrast. HETEROTAXY SYNDROME WITH POLYSPLENIA in a 61 years old woman. Mesocardia and bilobed lungs.

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Fig. 18: Axial MDCT with contrast (arterial phase). SPLENIC SUBCAPSULAR HEMATOMA ASSOCIATED WITH CHRONIC PANCREATITIS.

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Fig. 19: Axial MDCT with contrast (portal phase). SPLENIC SUBCAPSULAR HEMATOMA ASSOCIATED WITH CHRONIC PANCREATITIS.

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Fig. 20: Axial MDCT with contrast (arterial phase). SPLENIC SUBCAPSULAR HEMATOMA ASSOCIATED WITH CHRONIC PANCREATITIS. Above and adjacent to the spleen, subphrenic location, shows image concerning with pancreatic pseudocyst.

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**Fig. 21:** Axial MDCT with contrast. **SPLENIC METASTASIS.** multiple lesions observed in liver and spleen in a 32 years old woman with vulvar melanoma.

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**Fig. 22:** DOPPLER ULTRASOUND, left upper quadrant. SPLENIC ARTERY ANEURYSM.

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**Fig. 23:** Axial MDCT without contrast. SPLENIC ARTERY ANEURYSM. Partially calcified.

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Fig. 24: Axial MDCT with contrast (arterial phase). SPLENIC ARTERY ANEURYSM. The liver shows a lesion with peripheral nodular enhancement concerning with hemangioma.

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Fig. 25: AngioCT 3D reconstruction. SPLenic ARTERy ANEURYSM. Yellow arrow.

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Fig. 26: Abdominal ultrasound, left upper quadrant. SOLITARY SPLENIC MASS (HAMARTOMA). Splenic solid mass measuring about 5 cm, iso-echoic, regular edge, with peripheral displacement of vascularization.

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**Fig. 27:** SOLITARY SPLENIC MASS (HAMARTOMA). 1. Axial MDCT without contrast. 2. Axial MDCT with contrast (portal phase). 3. Coronal MDCT with contrast (arterial phase). 4. Coronal MDTC with contrast (portal phase). The mass is not visible on unenhanced CT, delimit by vessels in the arterial phase and hypodense and ill-defined in the portal phase.

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Fig. 28: MRI.Axial and Coronal T2-weighted. SOLITARY SPLENIC MASS (HAMARTOMA). Hyperintense mass.

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Fig. 29: MRI Axial (dynamic study FAME). 1 BASAL T1 weighted :isointense 2 ARTERIAL: peripheral uptake peripheral vessels 3 PORTAL hypointense central zone 4 LATE hypointense central zone 5 DELAYED 10 MIN isointense as the splenic parenchyma.

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Conclusion

The spleen has a florid pathology, of which we generally see only a small part.

CT is currently the imaging method of choice for evaluation of the spleen.

Study with multislice CT, with its possibilities of "working" image, provides a high sensitivity when valuing, especially in unusual cases.
References


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