Sclerosing angiomatoid nodular transformation (SANT) of the spleen

An asymptomatic 64-year-old man was evaluated with an abdominal CT because of a splenic mass incidentally detected at an ultrasonographic examination of the abdomen. His past history was unremarkable except for an endoscopic resection of an in situ cancer of the bladder. Routine laboratory tests were within normal limits.

CT examination showed a round 3.5-cm-diameter mass of the spleen iso-hypattenuating on non-enhanced images. The mass was hypoattenuating in the arterial phase, inhomogeneously enhancing in the portal phase and isoonattenuating in the equilibrium phase (Fig. 1). No other abnormalities were detected on CT examination. F-18 FDG CT-PET demonstrated a moderate activity of the splenic mass (standard uptake value 3.4) (Fig. 2). Because of the indeterminate nature of the mass, a laparoscopic splenectomy was undertaken. The operation was uneventful and the patient is in good conditions after two-year-follow up. Grossly the lesion was a nodular mass with fibrotic appearance encompassing brownish nodules (Fig. 3a). Microscopically the nodules were composed of vessels lined by endothelial cells, ovoid-spindle cells and extravasated erythrocytes (Fig. 3b). A dense hypocellular fibrous stroma separated the nodules. CD34 and CD31 immunostaining highlighted the vascular and single cells components.

Sclerosing angiomatoid nodular transformation (SANT) of the spleen is a rare recently described vascular entity of unknown origin with peculiar pathological and immunohistochemical features [1]. Pathogenetic hypothesis relies on an abnormal red pulp response to an exaggerated stromal proliferation due to disruption of small vascular outflow tracts, inducing vascular transformation of lymphatic sinuses [1,2]. SANTs of the spleen are frequently associated with neoplasms, leukemia, abdominal calcifying fibrous tumours or chronic diseases [1,2]. Lesions can be solitary or multicentric and variable in size, up to 9 cm in diameter [3]. Natural history is unknown, but increasing in size can be observed in follow up studies [4,5]. The SANT of the spleen can be asymptomatic and incidentally detected, but patients can complain of non-specific abdominal pain and discomfort or splenomegaly [1,2,4]; outcome is favourable after splenectomy [1,2,4,5]. The SANT of the spleen sonographically appears as a heterogeneous hypoechoic nodule or as isoechoic mass surrounded by a hypoechoic rim [6-8]; contrast-enhanced ultrasonography can show a diffuse enhancement or a
spoke wheel enhancing pattern [7,8].

The SANT is hypo-isodense on non-enhanced CT, sometimes with a central nodular calcification [3-5,9-12]. On dynamic CT the lesion can show different patterns: no definitive enhancement, hypoattenuation or inhomogeneous hyperattenuation in the arterial phase with a progressive centripetal enhancement in the portal phase with or without a spoke wheel pattern; on delayed images the SANT appears isoattenuating to the spleen, but larger masses can show a central scar [3,5-7,9-12].

Signal of the SANT is usually heterogeneously hypointense on T1 and T2 weighted MRI; a haemorrhagic component can sometimes be demonstrated [3,4,8,9,11,12].

Enhancement pattern on dynamic MRI resembles pattern of dynamic CT, but it seems more sensitive in detecting a radiating enhancement [3,11].

The SANT of the spleen shows a hypermetabolic activity with F18-FDG PET-CT, but it does not exhibit a macrophagic activity with 99mTc-sulfur colloid [3,4,6].

Since percutaneous biopsy of the spleen is not a popular procedure among radiologists, and because of uncertainties of imaging findings, diagnosis of a SANT of the spleen is usually achieved after splenectomy. Nevertheless radiologist should become familiar with this new entity, which should be considered in the differential diagnosis of splenic nodules; a spoke wheel pattern on dynamic imaging may suggest the proper diagnosis.

**Differential Diagnosis List:** Sclerosing angiomatoid nodular transformation of the spleen, Haemangioma, Hamartoma, Littoral cell angioma, Haemangiopericytoma, Lymphoma, Metastases

**Final Diagnosis:** Sclerosing angiomatoid nodular transformation of the spleen

**References:**


Kuo TT, Chen TC, Lee LL (2009) Sclerosing angiomatoid nodular transformation of the spleen (SANT): clinicopathological study of 10 cases with or without abdominal disseminated calcifying fibrous tumors, and the presence of a significant number of IgG4+ plasma cells. Pathol Int 59:844–850 (PMID: 20021048)


Figure 1

Description: Non-enhanced CT shows a round, minimally hypoattenuating mass of the spleen. Origin:
Description: The splenic nodule does not appropriately enhance in the arterial phase. Origin:
Description: A mottled enhancement of the nodule is appreciable in the portal phase. Origin:
Description: The splenic nodule is substantially isoattenuating to the surrounding parenchyma in the equilibrium phase. Origin:
Description: F18-FDG PET-CT indicates a hypermetabolic activity of the splenic nodule. Origin:
Description: Low power view showing angiomatoid nodules submerged in a fibrotic stroma. The stroma consisted of fibrous tissue, collagen bundles, haemosiderin deposits and sparse inflammatory cells. Origin:
Description: High power view of angiomatoid nodule showing the irregular-shaped vascular structures lined by plump endothelial cells with no or minimal atypia and spindle cells. Origin: