Focal splenic lesion dilemma in pediatrics: what radiologists need to know

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Introduction

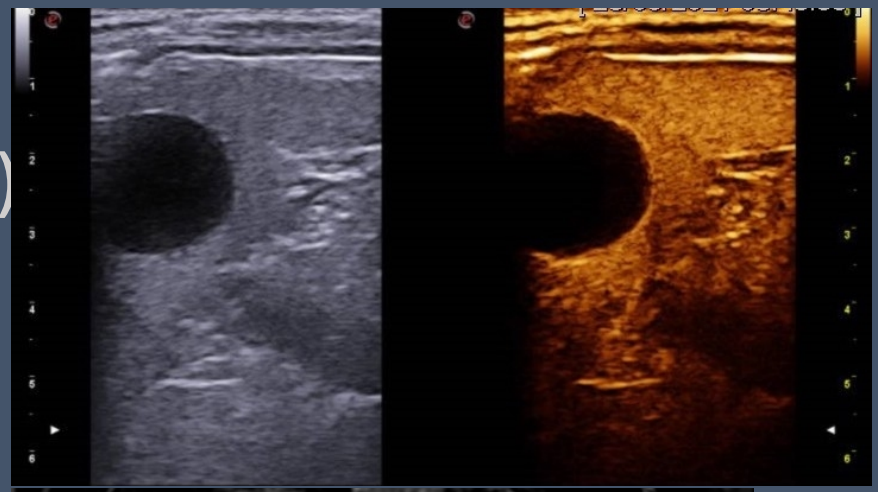
- Spleen is involved by a complex panorama of benign and malignant focal lesions in children

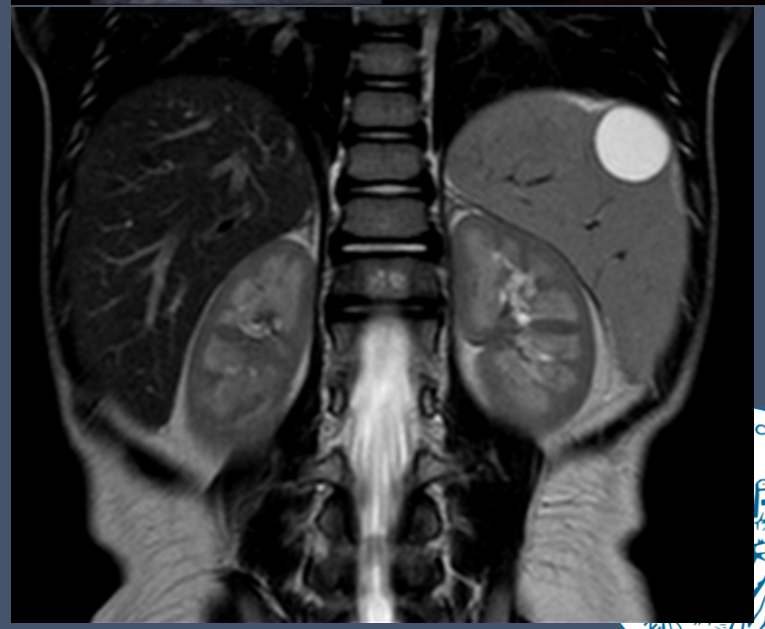
- They often generate bad headaches to radiologists:
  → relative infrequency
  → incidental finding
  → diffuse limited knowledge of the non-traumatic splenic pathology

- Purpose:
  → show radiological characteristics of the most relevant focal splenic lesion in pediatrics
  → help radiologists in solving the diagnostic dilemma

Benign lesion - Cyst

- most frequent splenic lesion in children
- *True cyst* (primary), lined with epithelium, are either congenital (epidermoid cyst) or parasitic (hydatid cyst)
- *Pseudocyst* are secondary to trauma, hemorrhage, infarction or inflammation
- often identical on imaging basis
- **US**: well defined, spherical, anechoic; possible debris and calcification
- **CEUS**: no enhancement
- **CT**: hypoattenuating, possible calcification
- **MRI**: hypointense on T1, hyperintense on T2, no enhancement



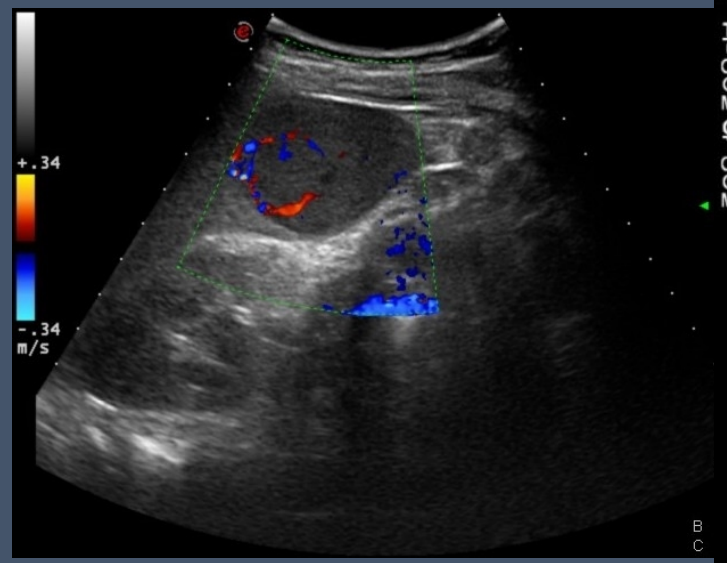


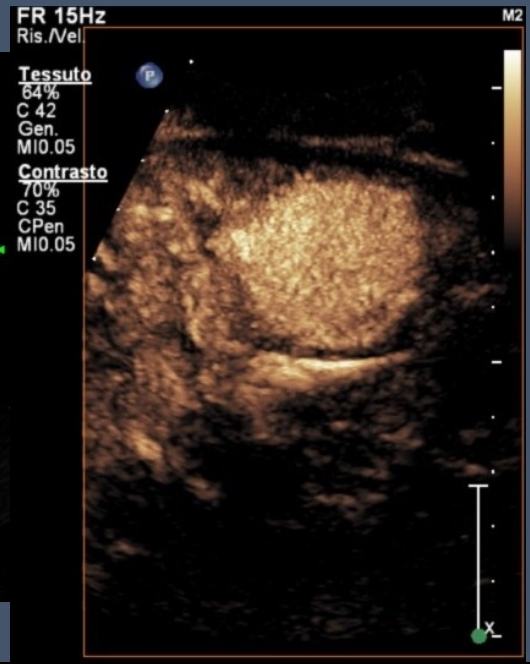
Benign lesion - Hemangioma

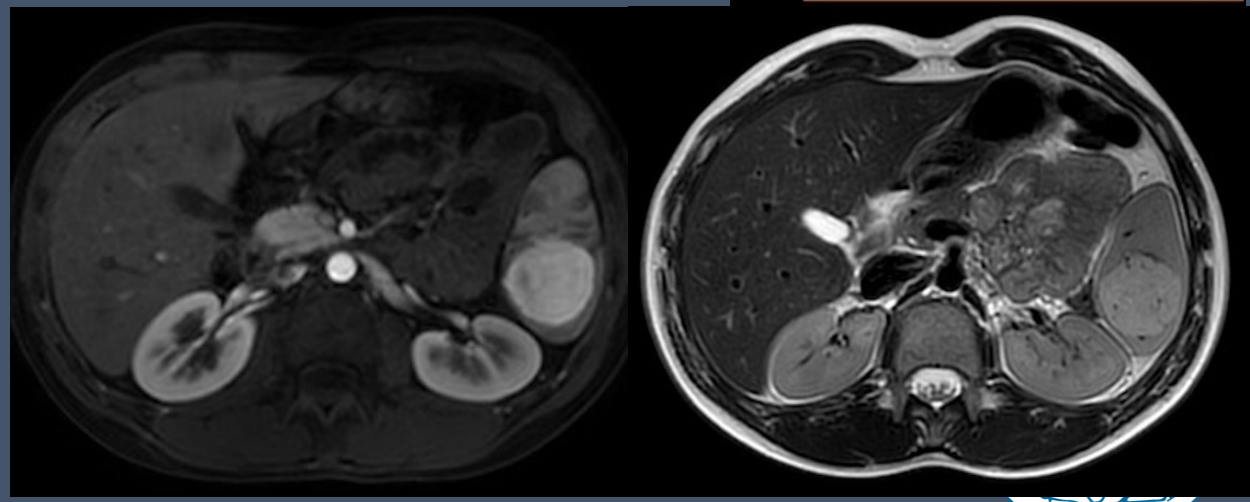
- most common primary splenic neoplasm
- vascular endothelial proliferation with blood-filled spaces
- congenital, solitary or associated with syndrome and skin hemangiomas
- appearance vary from solid to cystic
  → most commonly solid mass with cystic spaces
- possible complication: rupture, thrombosis and hemorrhage

Benign lesion - Hemangioma

- **US**: hyperechoic, iso- or hypoechoic. CD signal
- **CEUS**: isoenhancement or centripetal filling
- **CT**: iso- hypoattenuating, multiple possible CE pattern (peripheral, mottled heterogenous, immediate homogenous)
- **MRI**: typically iso-hypointense on T1 and hyperintense on T2, but challenging atypical presentation

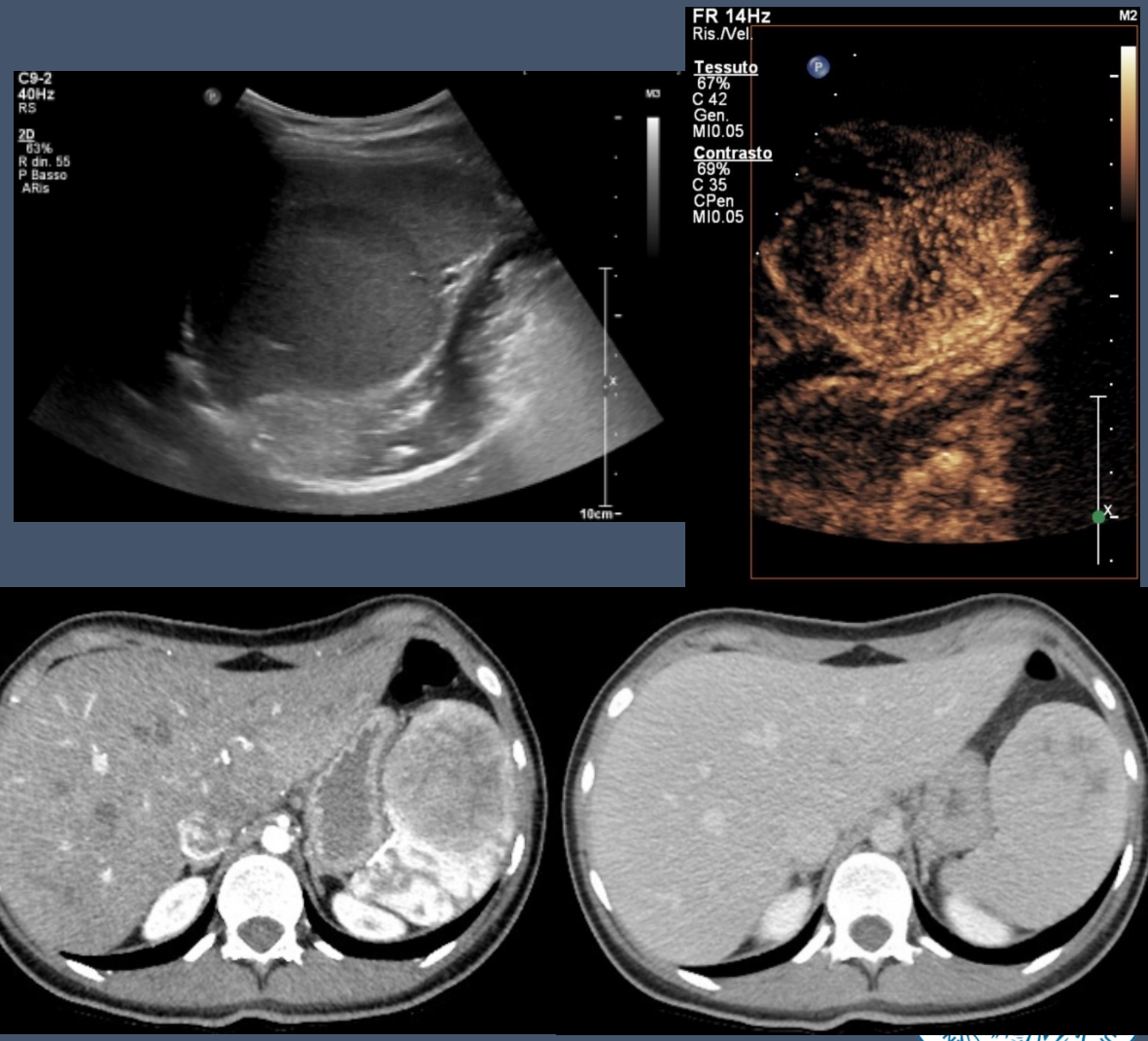






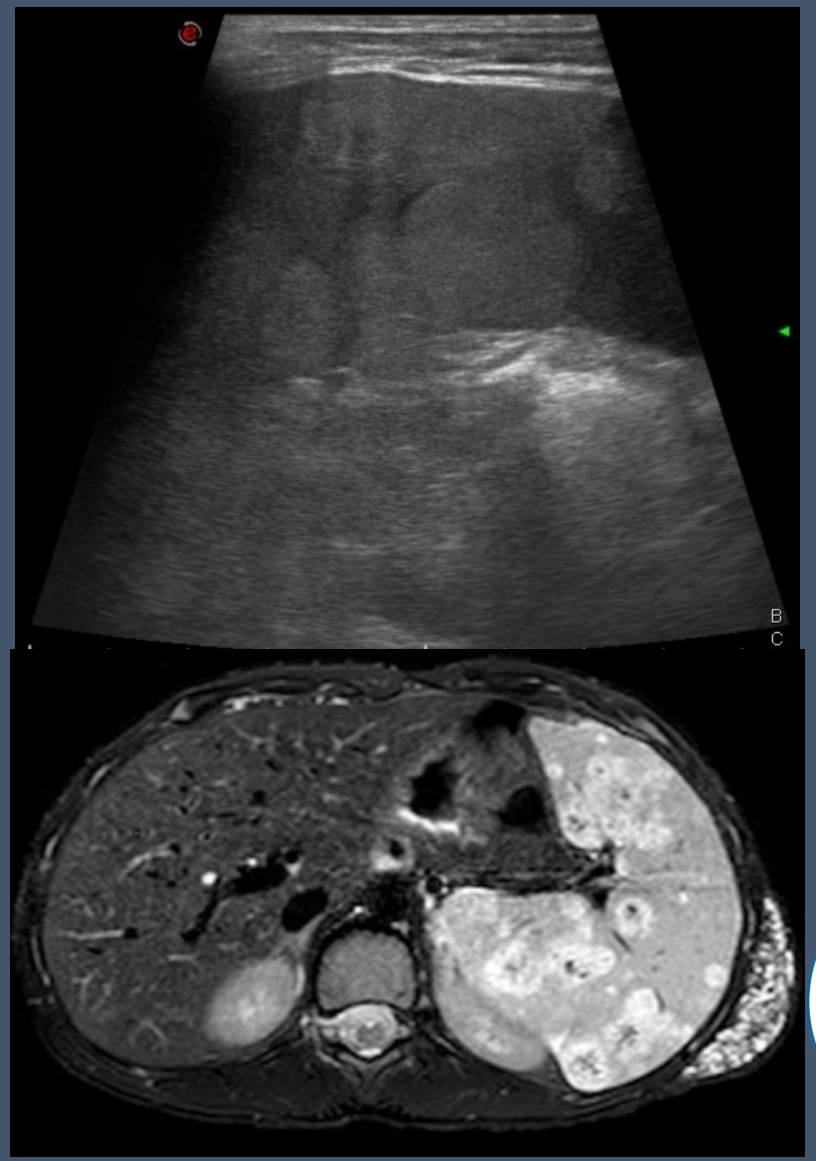
Benign lesion - Hamartoma

- almost frequent as hemangiomas
- disordered mixture of normal white and red pulp
- **US**: hypo- or iso/hyperechoic (cystic and hemorrhagic changes)
- **CEUS**: avid centripetal CE, late homogenous enhancement
- **CT**: solid hypo-iso-attenuating lesion, possible calcification and hemosiderin deposition
- **MRI**: isointense on T1, iso to hyperintense on T2



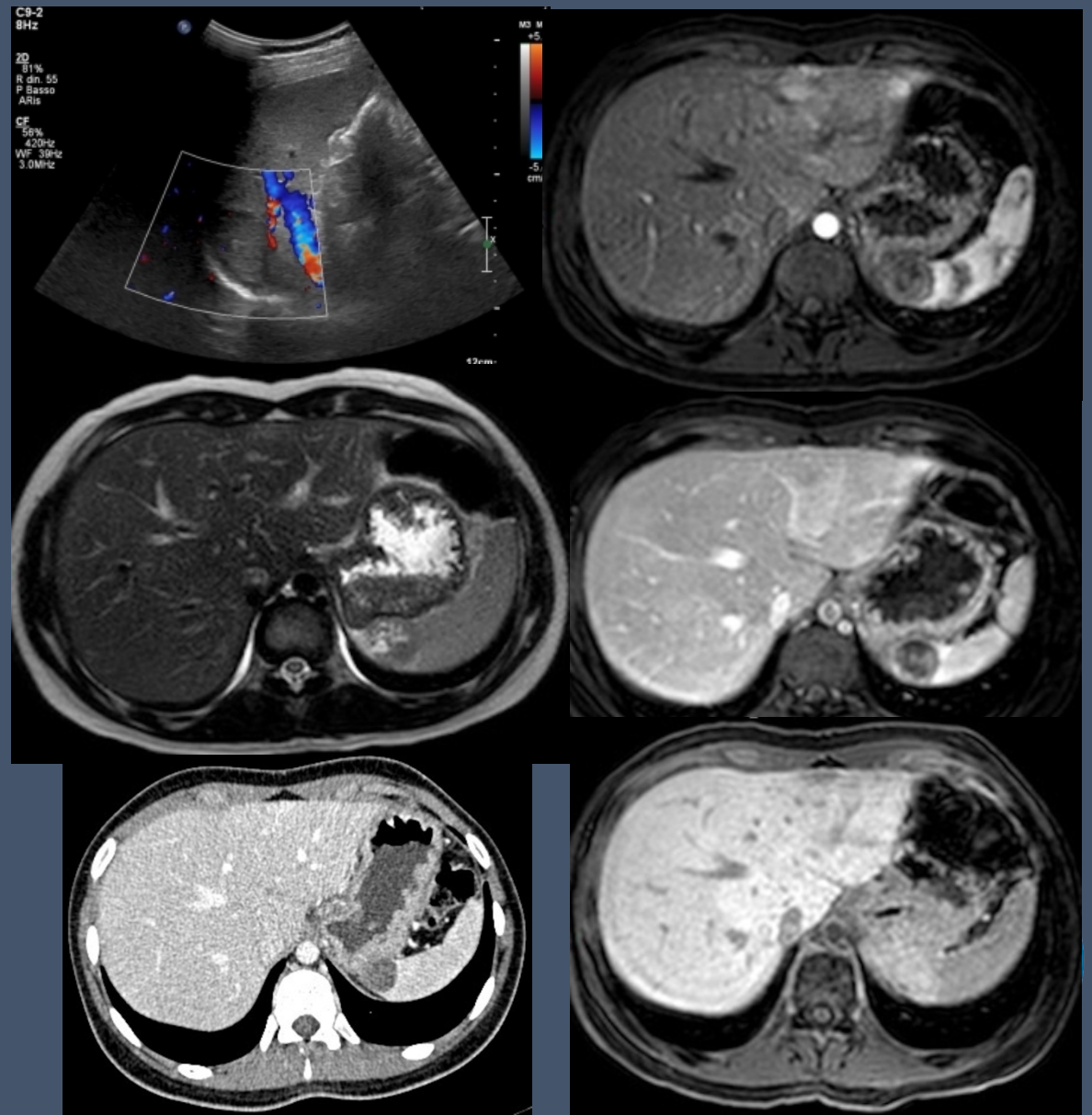
Benign lesion - Lymphangioma

- congenital endothelial-lined spaces filled with lymph with fibrous bands
- often *systemic lymphangiomatosis*
- **US**: anechoic round lesion, with possible debris (protein). Vascular signal on septa at CD.
- **CT**: hypoattenuating round lesion, without CE, possible calcification
- **MRI**: hypointense on T1 and hyperintense on T2 (possible T1 hyperintense area for protein and hemorrhagic material)



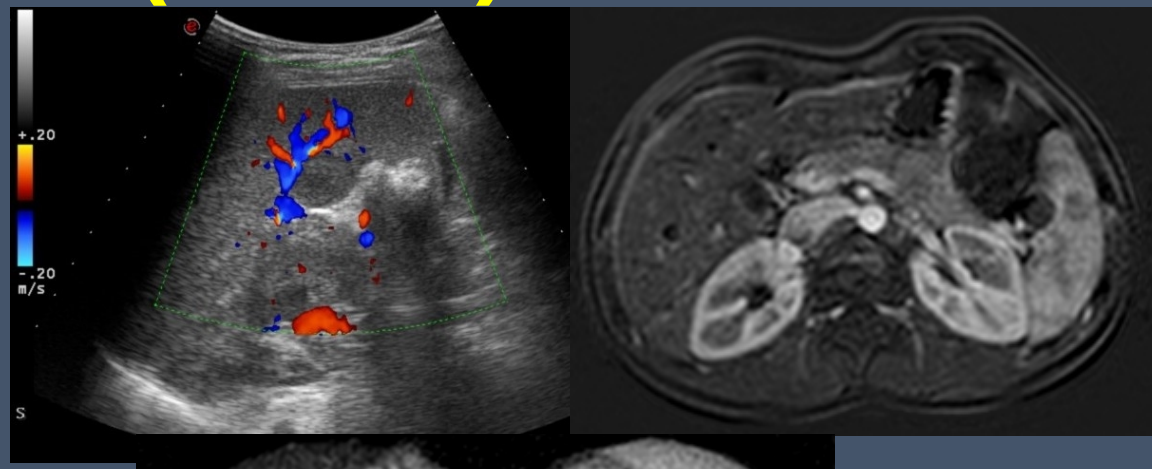
Benign lesion - Littoral cell angioma

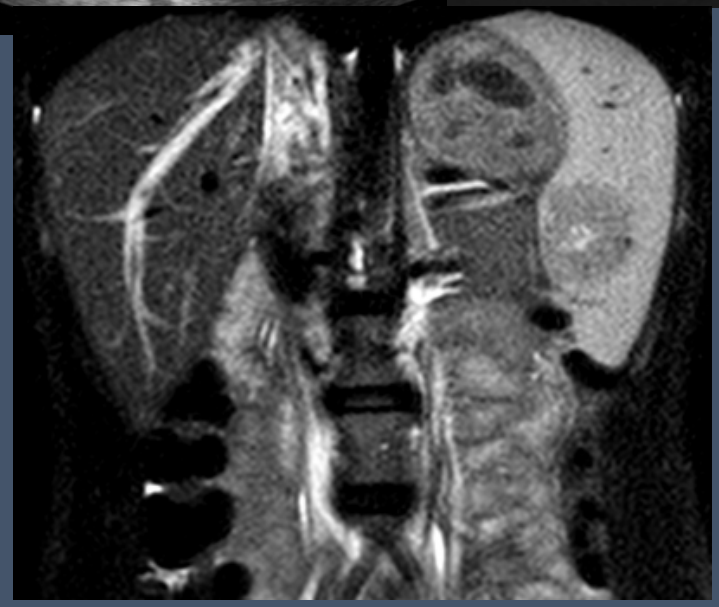
- red pulp littoral cells proliferation
- rare in children
- usually splenomegaly, anemia and thrombocytopenia and FUO
- multiple round lesions, but solitary lesion described
- US: heterogenous iso-hypo-hyperechoic multiple nodules
- CT: isoattenuating lesion, with late enhancement
- MRI: generally markedly hypointense on T1 and T2



Sclerosing angiomatoid nodular transformation (SANT)

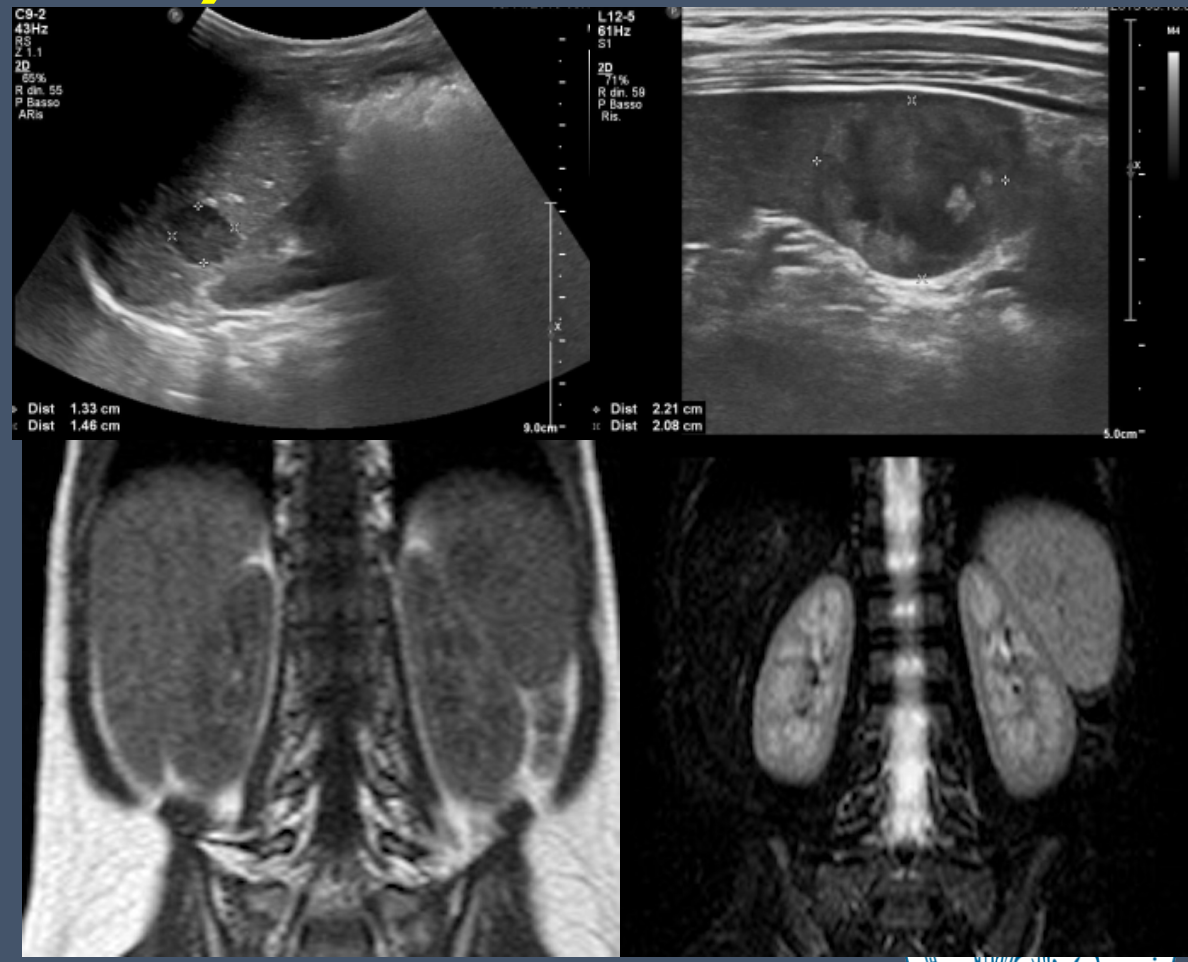
- angiomatoid nodules entrapped by non-neoplastic stromal proliferation
- round well-defined solitary lesion
- **US**: hypoechoic mass
- **CT**: iso-hypoattenuating lesion; *specific* CE pattern of vascularized tissue penetrating from periphery with fibrous hypovascular center (*spoke wheel pattern*)
- **MRI**: iso-hypointense on T1 and T2 with hyperintense central scar on T2





Benign lesion - Inflammatory myofibroblastic tumor (IMT)

- rare benign-intermediate entity, previously known as *inflammatory pseudotumour*
- myofibroblastic proliferation with central scar
- US: well-defined hypoechoic lesion
- CT: hypoattenuating mass, possible calcification and delayed heterogenous CE (no central scar)
- MRI: iso-hypointensity on T1 and hypointensity on T2 (fibrosis)



Malignant - Lymphoma

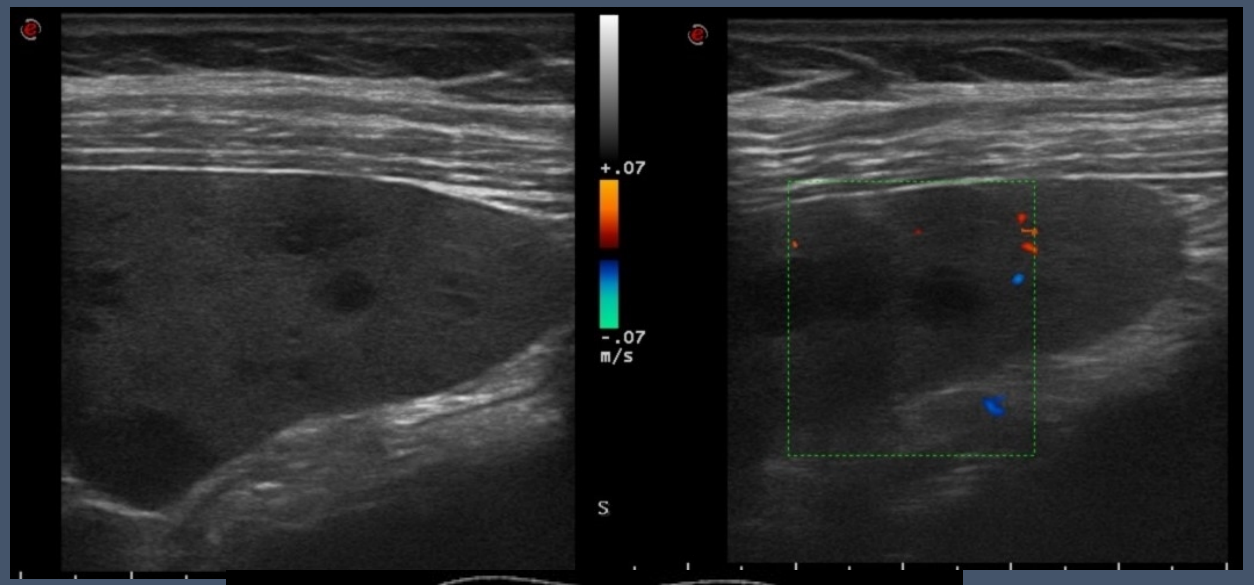
- main cause of splenic malignancy in children
- rarely primary lymphoma, involved in 30-40% of systemic lymphoma (mainly non-Hodgkin diffuse large B-cell)
  → check for mesenteric and retroperitoneal lymph-nodes
- splenic involvement upstages Hodgkin lymphoma
- splenomegaly in 80% of cases

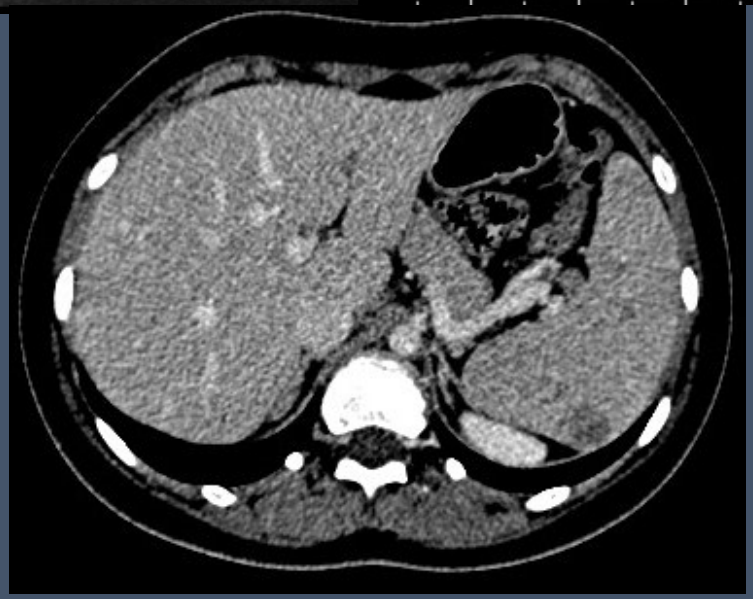
multiple *imaging pattern*:

- splenomegaly without discrete mass
- small focal or large nodular lesions
- solitary nodular lesion
- infiltrative bulky lesion

Malignant - Lymphoma

- **US**: hypoechoic lesion, no CD
- **CEUS**: high sensitivity, well defined defect due to rapid wash-out
- **CT**: hypoattenuating lesion, uncommon calcifications (might be present after treatment); without or with poor CE
- **MRI**: iso- to hypointense on both T1 and T2, without or with poor CE





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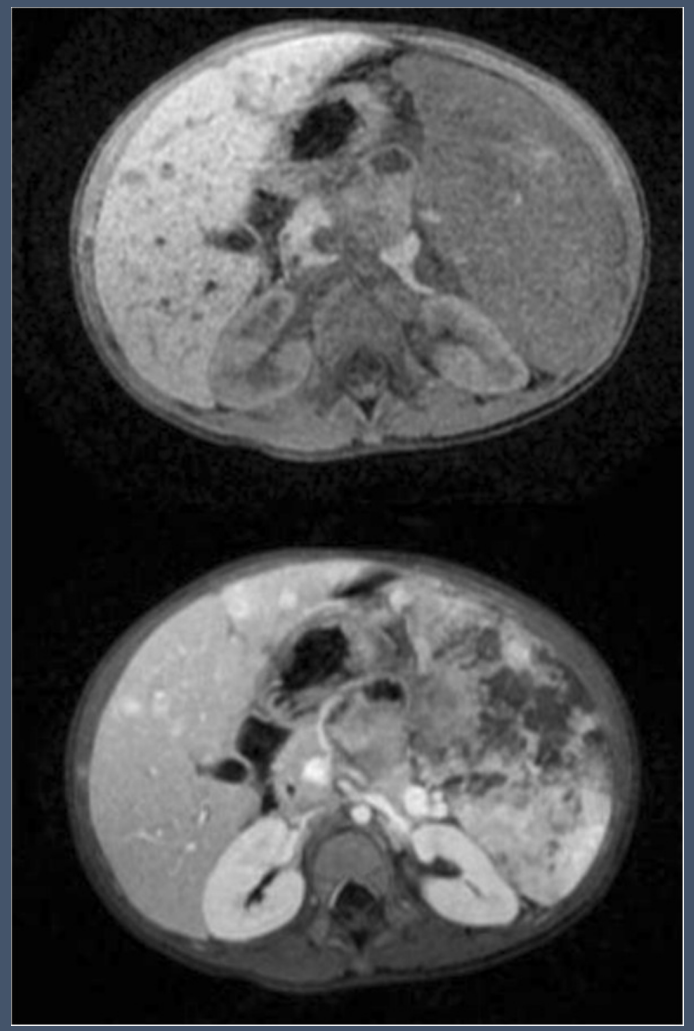
Malignant - Angiosarcoma

- **US**: splenomegaly, splenic heterogeneity, poorly defined solid and cystic lesions. Areas of hemorrhage and necrosis. Increased CD signal in solid portions
- **CT**: heterogeneous lesion with areas of low density and necrotic degeneration, heterogeneous CE
- **MRI**: hyper-/hypointense on T1 and T2 depending on the presence of blood products and necrosis



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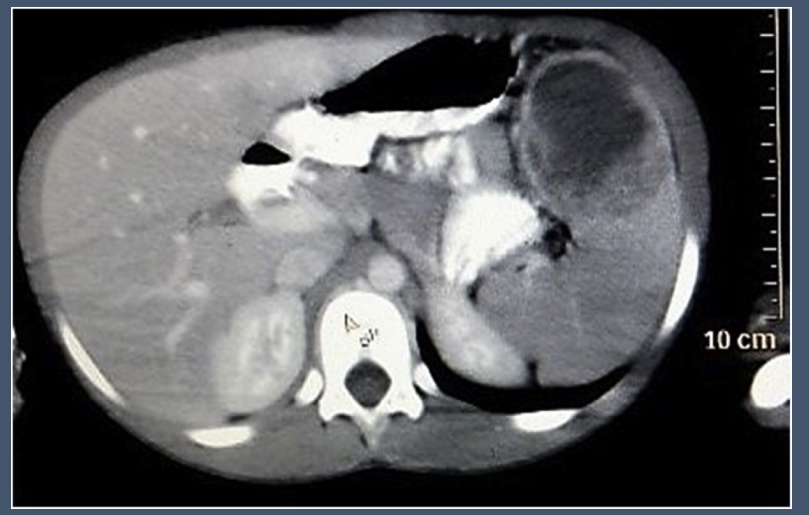
Infection

- multiform panorama of infectious lesions
- typically immunosuppressive states

- **abscess**: solid and cystic (acute stage) or cystic (chronic stage) lesions; poorly demarcated echoic lesions with low SI on T1 and high SI on T2

- **aspergillosis**: mass-like hypo-hyperechoic and hypoattenuating lesion; possible *cortical rim sign* (infarction)



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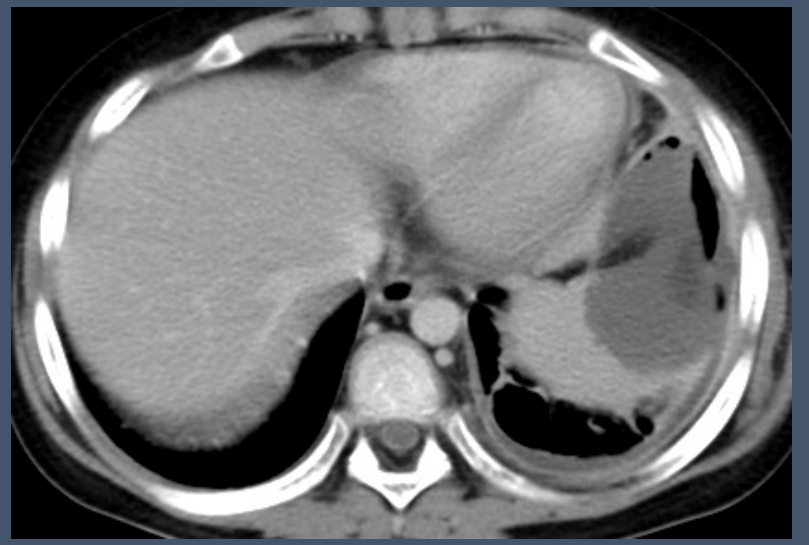

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Teaching point