Case 12265

Intrahepatic portosystemic venous shunt: colour Doppler and MDCT findings
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Section: Abdominal imaging
Area of Interest: Liver
Procedure: Diagnostic procedure
Procedure: Contrast agent-intravenous
Procedure: Contrast agent-oral
Procedure: Computer Applications-3D
Imaging Technique: Ultrasound
Imaging Technique: Ultrasound-Colour Doppler
Imaging Technique: Ultrasound-Spectral Doppler
Imaging Technique: CT
Special Focus: Congenital Case Type: Clinical Cases
Authors: Rafailidis Vasileios, Papadopoulos Georgios, Haritanti Afroditi, Destanis Evaggelos, Kalogera - Fountzila Anna
Patient: 50 years, male

Clinical History:
A patient was referred to the radiology department for abdominal ultrasound during health check-up.

Imaging Findings:
Abdominal ultrasound of the patient revealed multiple well demarcated, tubular anechoic lesions, situated on the right liver lobe. Colour Doppler technique demonstrated the presence of flow within these structures, identifying their vascular origin. There was a communication found between these structures along with an afferent vessel originating from a branch of the portal vein and an efferent vessel draining into a hepatic vein. (Fig. 1) Spectral analysis in both the afferent and the efferent blood vessels revealed a flow with venous characteristics whereas the flow derived from the communication was turbulent. (Fig. 2) The patient was then referred for CT to confirm the ultrasound findings. Unenhanced, arterial and venous phase contrast enhanced CT was performed. As suggested by Doppler imaging, the lesions were of vascular aetiology and were homogeneously enhanced only in the venous phase. A communication was shown between a branch of the portal vein and a hepatic vein. (Fig. 3, 4, 5)

Discussion:
The term Portosystemic Venous Shunt (PSVS) refers to the communication of a branch of portal vein with a systemic vein, which may be either intra- or extrahepatic. Extrahepatic PSVS can be secondary to portal hypertension due to cirrhosis whereas intrahepatic PSVS (IPSVS) is rarer and considered to be congenital. [1] IPSVS measure more than 1 mm and may be partially located outside the liver. [2] A classification of IPSVS was introduced by Park et al. Hepatic vascular malformations in general have a reported incidence of 0, 1%. [1, 3] IPSVS may be found incidentally in asymptomatic patients but in cases with severe shunting, hepatic encephalopathy may occur. Thus, prognosis is defined by the lesion’s size, the resulting shunt ratio and patient’s
Liver tests can be elevated in some cases. IPSVS can be evaluated by US, CT and MRI. The imaging findings depend on the type of shunt. In general, imaging modalities will identify IPSVS as a single or multiple tubular or aneurysmal communication between a branch of the portal vein and a hepatic (systemic) vein. Gray-scale US reveals a single or multiple anechoic lesions within the liver parenchyma. Portal and hepatic veins may appear enlarged. It is important to use colour Doppler imaging and pulse wave technique to assess the direction and the exact waveform of the blood flow within the shunt. According to the type of vascular malformation, the flow can be arterial, portal or hepatic venous. In IPSVS, the flow has venous characteristics and is influenced by respiration or right atrial contractions. Namely, the waveform is continuous when derived from a branch of the portal vein, turbulent when corresponding to the shunt or finally biphasic when derived from a hepatic vein. CT reveals a mass with homogeneous enhancement after contrast medium injection and the exact branches which communicate between portal and hepatic veins. MRI has similar findings but gives the opportunity to evaluate the lesion on sagittal and coronal planes and with MR venography. IPSVS need treatment only if symptomatic. Encephalopathy can be treated with dietary changes or embolisation of the shunt in more severe cases.

**Differential Diagnosis List:** Intrahepatic portosystemic venous shunt, Intrahepatic portosystemic venous shunt, Extrahepatic portosystemic venous shunt, Hepatic arteriovenous malformation, Arterial aneurysm, Hepatic cyst, ?umour

**Final Diagnosis:** Intrahepatic portosystemic venous shunt

**References:**

Description: This split-screen image shows anechoic rounded lesions on the right liver lobe near the gallbladder (right image). On the left, colour Doppler image demonstrates blood flow within these lesions in opposite directions. Origin: Radiology Department, AHEPA Univerity Hospital of Thessaloniki, Greece.

Description: This split-screen image reveals a tubular anechoic lesion connected to an afferent and an efferent vessel (left). Colour Doppler technique demonstrates blood flow within these lesions with opposite directions and mosaic pattern (right). Origin: Radiology Department, AHEPA Univerity Hospital of Thessaloniki, Greece.
Description: A split-screen image taken in a different plane confirms the aforementioned findings.
Origin: Radiology Department, AHEPA University Hospital of Thessaloniki, Greece.
Description: Spectral analysis of the afferent blood vessel reveals a flat, monophasic flow which is consistent with venous flow. **Origin:** Radiology Department, AHEPA University Hospital of Thessaloniki, Greece.

Description: Spectral analysis of the central part of the tubular lesion reveals a flow with venous characteristics but more turbulent than previously. **Origin:** Radiology Department, AHEPA University Hospital of Thessaloniki, Greece.
Description: Spectral analysis of the efferent blood vessel demonstrates again a flow with venous characteristics. Origin: Radiology Department, AHEPA University Hospital of Thessaloniki, Greece.
Figure 3

Description: In pre-contrast images, the abnormality was not demonstrated. Origin: Radiology Department, AHEPA University Hospital of Thessaloniki, Greece.
Description: In arterial phase, the abnormality was still not demonstrated. We can see the hepatic artery enhanced along with the aorta. **Origin:** Radiology Department, AHEPA University Hospital of Thessaloniki, Greece.
Description: In the venous phase, the lesion is homogeneously enhanced and is connected to the portal vein. Origin: Radiology Department, AHEPA University Hospital of Thessaloniki, Greece.
**Description:** This axial image demonstrates the connection of the lesion to the hepatic vein. **Origin:** Radiology Department, AHEPA University Hospital of Thessaloniki, Greece.
Description: This coronal reconstructed image shows the exact location of the lesion inside the right liver lobe, near the gallbladder. The lesion is connected to a hepatic vein. Origin: Radiology Department, AHEPA University Hospital of Thessaloniki, Greece.
Description: This sagittal reconstructed image confirms the location of the lesion. The lesion seems to be located in hepatic segment 5. Origin: Radiology Department, AHEPA University Hospital of Thessaloniki, Greece.
Description: This VRT image demonstrates the connection of the malformation to both the portal vein (PV) and the hepatic vein (HV). The malformation (arrow) is selectively reconstructed and observed from above. Origin: Radiology Department, AHEPA University Hospital of Thessaloniki, Greece.
**Description:** This VRT image demonstrates the location of the malformation in an illustrative way.

**Origin:** Radiology Department, AHEPA University Hospital of Thessaloniki, Greece.