Editorial

Medical Ultrasonography
2011, Vol. 13, no. 4, 265-266

Is there a place of contrast-enhanced ultrasonography in deep vein thrombosis?

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Since the introduction of ultrasound in clinical practice, this method proved good capabilities in demonstrating vascular morphology. We can find the advantages of vascular ultrasound investigation emerging from the physic principle base of ultrasound examination. Blood vessels represent relative superficial structures (in superior and inferior limb), presenting high differences between wall density (solid) and the blood content (liquid). For this reason, even the low-tech piece of ultrasound equipment could display vessels for morphologic examination, in normal conditions, using appropriate transducers. Introduction of Doppler examination increased the value of vascular ultrasound, adding functional information. The result was almost an ideal method for vascular investigation, at least for peripheral vessels. Despite this, the "gold standard" method for vascular examination was, for long time, the angiography (with the application for veins- venography). Angiography is a high invasively method and for this reason, the frequency of this ionizing examination decreased last years. In radiologic departments, angiography was partially replaced by angio-computed-tomography (A-CT) or angio-magnetic resonance (A-MR). But these methods are ionizing (A-CT) and expensive (A-MR).

The introduction of contrast enhancement in ultrasound, with a distinct vascular phase, enlarged the perspective of vascular examination. Contrast enhancement ultrasound (CEUS) proved to be extremely reliable in extra-vascular applications, especially in tumor diagnosis (including detection and characterization).

Using contrast enhancement in vascular ultrasound, deep small artery and vein could be depicted with greater chances to find a deep vein thrombosis (DVT). Usually, morphologic examination and a combination of Color Doppler (CD) technique and venous compression (VC) increase diagnostic accuracy of DVT, but results still remain unacceptably low, especially in obese patients, local inflammation, edema, etc [1].

In this issue of Medical Ultrasonography, the study of Spiss and all visualized the fibular-, posterior tibial-vein group, the popliteal, femoral, the external iliacal and the inferior caval vein at defined levels, in three healthy volunteers, using contrast enhancement (SonoVue- Bracco). According to their results, the intended segments of the deep venous system of the lower limb were clearly visualized between 45 and 350 seconds by CEUS, including posterior tibial and fibular veins and greater saphein vein. They demonstrated the overall technical feasibility and basic potential of CEUS in the visualization of the tiny vessels of the distal limb after systemic ultrasound contrast administration. The authors concluded that method is "time saving, non-ionizing, easy to use and broadly available technique of CEUS could be path breaking in the overall diagnosis of DVT, especially in the often non-conclusive and tricky cases seen in patients with bad US conditions" [2].

Our experience is limited in using CEUS in DVT. We used SonoVue in two cases where the clinical suspicion was DVT, and we succeed by depicting thrombus in superficial femoral vein in Hunterian segment, in one case. The second case was a clinical suspicion of DVT in lower limb and the anticoagulant therapy confirmed this supposition, but ultrasound was not able to identified any thrombus.

A search on internet reveled just few communications regarding CEUS in DTV and almost all were focused on portal vein thrombosis (PVT). Comparing the performances of CEUS and spiral computed tomography (CT) in the detection and characterization

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of PTV complicating hepatocellular carcinoma (HCC), Rossi an all. communicate that CEUS detected 50/50 (100%) thrombi and correctly characterized 49/50 (98%). CT detected 34/50 (68%) thrombi and correctly characterized 23 of these 34 (68%). CEUS outperformed CT in terms of both thrombus detection ($P < 0.0001$) and characterization ($P = 0.0001$). CEUS appears to be significantly superior to CT for detection and characterization of PVT complicating HCC [3].

Song ZZ and all, prospectively studied with CEUS seventeen consecutive patients who had cirrhosis, liver tumors, and PVT. Presence or absence of thrombus enhancement on CEUS were considered diagnostic for malignant or benign PVT. The sensitivity, specificity and accuracy was 100%, 66.7% and 93.3% at diagnosis of malignant PVT using CEUS. They conclude CEUS could be used to differentiate between benign and malignant portal vein thrombosis (PVT) in patients who had liver tumors [4]. According to Sparchez and all using CEUS for guiding PVT biopsy is a new, promising method with excellent results in establishing the nature of a portal thrombus [5].

If, according to many authors [6], CEUS have a well know place in the diagnostic of portal vein thrombosis, its utilization for diagnostic of DVT is still to study. If Doppler examination is irrelevant and VC is not possible, an ultrasound operator must rely on different criteria in his diagnostic of DVT. Detection of a thrombus seems to depend of many factors, including the diameter of the vessel, the distance from the probe and the age of thrombus. But one of the first condition is to see the vessel. And CEUS seems to be an excellent modality to visualize even deep vessels, or in local difficult US conditions.

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