
Volume 10 - Issue 4, 2010 - Interview

Hot Topics in Medical Imaging in the Czech Republic

Contrast-enhanced ultrasound (CEUS) offers such benefits as the lack of need for ionising radiation, the possibility of real-time imaging, of the application of a second contrast media injection a few minutes after the first one, the possibility for quantification and the higher sensitivity and specificity offered by this technique in the detection and characterisation of small lesions under 1.5 cm. As CEUS represents an innovative approach to imaging of the vascularity on the macro- and microcirculation it has become a useful diagnostic tool in everyday practice in the Czech Republic.

Role of Conventional Ultrasound

The role of conventional ultrasound in imaging many organs in the body is limited to conventional colour and spectral Doppler imaging. Although Doppler imaging may provide valuable directional blood flow information, it is most effective for evaluating large blood vessels with fast-flowing blood. The ability of Doppler imaging to detect blood flow at the parenchymal level, where the tissue is moving at the same speed or faster than the blood that perfuses it, is limited. The development of sonographic contrast agents based on microbubbles has allowed us to detect flow in circulations at a level lower than would otherwise be possible. This invention has also stimulated development of contrast-specific imaging, which means special hardware and software systems produced by different ultrasound manufacturers. These methods could identify the echo from the contrast media and thereby suppress that from solid tissue, so they provide a real-time "subtraction".

CEUS and CT/MR

CEUS shows high concordance with computed tomography (CT) or magnetic resonance (MR) imaging, especially for the arterial phase. Discordance in the portal venous phase may reflect the tendency of CT and MR contrast agents to diffuse into the interstitium unlike with microbubbles. Intravenous sonographic contrast agents are confined to intravascular spaces and therefore don't leak through the vessel wall.

In 2004, we started to use the second generation of contrast agents, which are resistant to pressure changes occurring in the left ventricle and pulmonary capillaries, and have stability more than six hours after preparation of the solution as well as persistence in the blood-pool nearly ten minutes after intravenous bolus. Our experience during this period was included in an international multi-centre study made by Bracco and since then the use of contrast media in ultrasound examinations has become much more popular.

Reimbursement for CEUS Procedures

Contrast media was approved for use in the Czech Republic a while ago, now. However, it was not refunded by health insurance companies, so many radiological departments did not use it. Since January 2010, one of the contrast media agents (SonoVue, Bracco) is refunded by health insurance companies in certain circumstances. Thus the interest in CEUS in this country has increased a lot. With the guidance of our department, three teaching centres were established in the Czech Republic accordingly, where radiologists can learn not only a theory to understand the behaviour of bubbles when exposed to an ultrasound beam, as well as the basic physics, technology and the principle of contrast-specific imaging, but in these three-day hands-on workshops they can also examine real patients personally, try different machine pre-settings and see many types of pathological findings. After the course they obtain a certificate of competency. This certificate is essential to have the right to sign a contract with the health insurance company.

Courses in CEUS in Big Demand

There is very big demand for such courses, inter alia because skilled radiologists can then routinely perform contrast ultrasound examinations in their department. In each teaching centre around four courses are held per year in the Czech language, and in our department two international CEUS symposium workshops in English take place annually. This system is co-organised by the Czech Radiological Society and by the president of this society, doc. MUDr. Marek Mechl, Ph.D., MBA, who also co-signs the certificate. Once a year all CEUS users must attend the meeting where they have to present their experiences.

Performing CEUS exams is relatively easy, we need just the appropriate ultrasound machine that allows contrast-specific imaging, contrast media for ultrasound imaging and, of course, image interpretation skills. The administration of the contrast agent is provided by one nurse and one medical doctor – in our country this must be a trained radiologist. Recording and storing the cine-loop allows a second reading later.

In comparison to other modalities as CT or MR, CEUS has many advantages, as an absence of ionising radiation, high cost-effectiveness, high patient compliance, it can provide a real time imaging - not only two or three selected perfusion phases, it has the possibility of a second contrast media injection after few minutes, enables onestop- shopping in incidentally found lesions, therapeutic monitoring, nowadays there is high-quality quantification software available in the market and it has proven high accuracy in providing specific contrast-enhancement patterns that are comparable to those obtained on MRI.

Published on : Wed, 15 Dec 2010