

Multiparametric ultrasound (MPUS) or “the many faces” of ultrasonography

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Ultrasound (US) is still seen as a “Cinderella” of the imaging techniques, without taking into consideration the many advantages of the method. It is a real time, dynamic method, very accessible, rather inexpensive, but (and maybe more important) a non irradiating technique, repeatable and very well accepted by patients. Even if for some pathologies the accuracy of conventional US is not so high (for example the positive diagnosis of focal liver lesions), in other situations it is the best method for the diagnosis (for example gallbladder stones, biliary obstruction).

The major drawbacks of US are considered operator-dependence and lack of specificity and accuracy for some diagnoses. On the other hand, with proper training, it is a very good method for orientation in clinical practice and a very good screening method. Because it is well accepted by the patients it is also a good follow up method.

If the drawback of being an operator dependent method can be overcome by training, the lack of accuracy is a disadvantage that is harder to overcome.

One of the criticisms brought to US in the past was the impossibility to characterize the vascularization of different lesions, a feature necessary for the correct diagnosis of the different pathologies. Even if the Doppler techniques are established ultrasound techniques as M and B-mode, the lack of possibility to perform a contrast enhanced study, such as for contrast enhanced computer tomography (CE-CT) or contrast enhanced magnetic

resonance imaging (CE-MRI), limits the possibility of characterization of different lesions detected by US, and on account of these limits the accuracy of the technique.

The development of new applications in US in the last period has improved the position of this imaging technique in the management of different pathologies. The 3D and 4D US but, more importantly, contrast enhanced US (CEUS) and US based elastography techniques, provided the missing data required for a better diagnosis accuracy of US, and created the concept of multiparametric ultrasound (MPUS) [1], a term borrowed from sectional imaging, especially MRI.

There are several examples in the literature of the role of MPUS for the assessment in different pathologies: prostate cancer [2-4], chronic kidney diseases [5], thyroid nodules [6] or parathyroid lesions [7].

I want to bring attention to another organ – the liver, where the role of MPUS is already well known and emphasized also by other authors [8], and more specifically - focal liver lesions. US is an excellent imaging modality for the detection of liver tumors, but it lacks the necessary specificity for a correct positive diagnosis. The evaluation of a focal liver lesions can be very expensive (CE-CT or CE-MRI), needs time and usually is very stressful for the patients. CEUS changed this, because is an US technique that can be performed in the same session as conventional US: it takes 5 more minutes, and has good accuracy for the characterization of liver tumors [9]. The accuracy increases if we know if the lesion is developed on a cirrhotic or a non-cirrhotic liver [9]. US can answer today also this question, more precisely US based elastography, a technique with a very good accuracy for ruling in or ruling out liver cirrhosis in a very short time (less than 5 minutes) [10]. Elastography of the focal lesion can also be helpful for the diagnosis in some situations. Thus, in a three-step algorithm using MPUS, starting with conventional US, followed by elastography

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and then CEUS, we can make a complex evaluation of a focal liver lesion in the same session with a very good accuracy for the positive diagnosis.

In conclusion, US is here to remain in the big picture of imaging techniques and should be used, with all its available features, as the first line diagnostic method in many situations.

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