Ultrasound: “one stop shop” in hepatology

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Ultrasound is an old medical diagnostic procedure having being used for more than 50 years. Due to its advantage of being inexpensive applied by both clinicians and radiologists, its popularity has increased over time.

Ultrasound examination is used today in a variety of specialties and probably there are few locations where it is not used for diagnosis. It has been introduced in the curricula of many specialties, having the advantage to be used either at the point of care or at the bedside.

Ultrasound has been used in hepatology for a long time: to diagnose diffuse liver diseases (such as liver cirrhosis or fatty liver); to screen for liver masses (benign or malignant); to evaluate portal hypertension or ascites. Due to the evolution of ultrasound technique (development of Doppler techniques, of Contrast Enhanced Ultrasonography - CEUS, of liver and spleen elastography), this method has become a “one shop stop” in the evaluation of a hepatic patient!

What does this mean for the clinician? Physicians dealing with patients with liver diseases, after anamnesis and clinical examination, will continue with the ultrasound examination of the abdomen. In a few minutes an accurate diagnosis of ascites can be made (even for very small amounts of fluid); the size of the spleen can be measured (to find splenomegaly - spleen larger than 12 cm); signs of portal hypertension can be found (enlarged portal and splenic veins, development of collaterals, repermeation of the umbilical vein, etc). The examination of the liver is of particular interest: liver size, enlargement of caudate or quadrate lobes, irregularity of the liver sur-

face, analysis of the hepatic texture, fatty liver infiltration (“bright liver” with posterior attenuation), patency of the hepatic and portal veins. At the same time, the liver is examined for focal liver lesions (FLL), ultrasound being sensitive enough to discover such lesions.

When standard ultrasound is finished, a Doppler examination can be performed if required for the evaluation of vessels in conditions such as portal hypertension (when flow reversal can be observed), or when vein thrombosis is suspected. In FLLs a Doppler examination can help in some lesions such as focal nodular hyperplasia (FNH) or hepatocellular carcinoma (HCC).

In each patient, with only one push on a button, the hepatologist can immediately perform liver elastography. By performing Shear Wave Elastography (SWE), regardless if it is point SWE (using Acoustic Radiation Force Impulse technology) or 2D SWE (real time SWE), the liver stiffness can be evaluated as a marker of fibrosis severity. Cut-off values for different stages of fibrosis have been established for all SWE methods (sometimes varying according to the etiology). They vary slightly according to the type of ultrasound machine used. Results from meta-analyses and large multicenter studies have shown a good correlation between liver biopsy and SWE measurements, which increases with the severity of fibrosis. Spleen elastography can be used as a predictor of portal hypertension. Using combined elastographic measurements of liver and spleen stiffness, the accuracy for predicting portal hypertension can increase.

If a FLL is discovered in standard ultrasound, a CEUS examination can be performed immediately, so that a conclusive diagnosis can be obtained in less than 5 minutes, with approximately 90% accuracy for the differentiation of benign vs. malignant lesions and approximately 85% accuracy for the diagnosis of FLLs' type. There is hope now to increase the diagnosis accuracy by performing FLL elastography after CEUS in inconclusive cases.

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Moreover, if the FLL must be punctured for diagnostic purposes, ultrasound guidance is the easiest and cheapest modality. Ultrasound guidance is the standard to treat FLLs such as HCC or metastases during percutaneous ablative techniques (ethanol injection, radiofrequency ablation or laser ablation).

Thus, by having all these opportunities in an ultrasound machine the hepatologist's duty becomes easier.

A patient comes to consultation with a liver pathology and can leave the room in less than 30 minutes with a final diagnosis. Considering the shorter time before a final diagnosis can be obtained, the lesser cost of evaluation (with a smaller need for liver biopsy or cross sectional radiological techniques) this strategy of “one shop stop” in hepatology seems to be very promising for daily practice!