EDITORIAL

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Liver Elastography – Where are we Now?

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Patients with chronic liver diseases are quite numerous in daily practice, in some areas due to chronic viral hepatitis, in others due to non-alcoholic (NASH) or alcoholic steatohepatitis (ASH). Other chronic liver diseases, such as autoimmune or cholestatic are also not very rare. The prognosis in chronic liver disease is determined by the severity of fibrosis. Ideally, therapy must be initiated to stop the disease evolution before the occurrence of severe fibrosis and cirrhosis.

For approximately 50 years, liver biopsy was the indisputable „gold standard" for the evaluation of liver diseases. Even if this procedure is not agreed to by patients, the need for a precise grading and staging made physicians propose and perform this procedure. In the last 10-15 years, efforts were made to develop non-invasive modalities for the evaluation of fibrosis in chronic liver diseases. Biological tests and elastographic methods were evaluated for comparison with liver biopsy.

Currently, in many countries, the number of liver biopsies is sharply decreasing in favor of non-invasive assessment methods. Why? Because these procedures are well accepted by patients, repetitive without any risk, and not very expensive. Also because there are some criticisms regarding liver biopsy: in many cases a very good specimen is not obtained [1], there is a risk of complications and very rarely patients accept repeating the procedure.

Let's consider liver elastography, and especially ultrasound based elastography. Transient Elastography (TE) (FibroScan) was the first elastographic method validated in clinical practice in some countries such as France [2], and included in the EASL Guidelines [3]. Many papers and quite a few meta-analyses [4-6] recorded the results of this method for liver stiffness assessment as a marker of fibrosis in chronic liver diseases, starting with chronic hepatitis C, followed by chronic hepatitis B, NASH, primary biliary cirrhosis and others. The disadvantages of this method are the following: it is a blind method (not echo-guided); it cannot be performed in patients with ascites; it is influenced by several confounding factors (such as elevated aminotransferase levels, biliary obstruction or heart failure) and, not the least, the fact that, even if the machine is quite expensive, it must be calibrated two times yearly (with additional costs). Transient elastography is very accurate for the assessment of advanced fibrosis (especially cirrhosis), but it is of limited value for differentiating contiguous stages of fibrosis (especially mild).

To avoid the lack of echoguidance in TE, new elastographic methods included in ultrasound machines were developed. They can be divided into strain elastography (in which either manual compression or motion from heart beats are used to stimulate the tissue) and shear wave elastography (in which tissue excitation is accomplished by an acoustic radiation force push pulse generated by the ultrasound probe). Shear wave elastography (SWE) can be divided into point SWE and real time (2D) SWE.

Few studies have been published regarding strain liver elastography, in which usually some indexes, such as the Liver Fibrosis Index are used, but the results have not yet been confirmed, so this method is not used in clinical practice for liver stiffness evaluation.

On the other hand, SWE methods are increasingly used, with the advantage that the result is expressed as a numeric value (kiloPascals or meters/second). Another advantage of SWE as compared with TE is the visualization of liver structures and the ability to choose the region of interest, avoiding vessels or the liver capsule. SWE modules are included

in high-end ultrasound machines able to perform several other ultrasound investigations, such as Doppler examinations or Contrast Enhanced Ultrasound (CEUS).

Using ARFI (Acoustic Radiation Force Impulse) technology, a point SWE technique, valid measurements can be obtained in the vast majority of cases [7]. Comparative studies evaluated by meta-analyses proved a similar performance of this technique as compared with TE for the assessment of moderate and severe fibrosis [8] and a good accuracy for diagnosing moderate to severe fibrosis [9]. The confounding factors are the same as in TE, but the feasibility seems to be better [8]. This method can also be used in patients with ascites.

2D-SWE was introduced more recently in the investigation of liver diseases. It has the advantage of being a color coded as well as a numeric elastographic method. The region of interest is chosen by a standard ultrasound examination and, in real time, both a color-coded image and a numeric value are displayed. Published studies show a good correlation of this method with liver histology [10], while major studies are ongoing. All published studies have shown a similar performance of 2D-SWE as compared with TE [11].

The number of companies involved in the development of ultrasound-based elastography is increasing and, probably, all major ultrasound companies will include an elastographic module in their machines in the next future.

Nowadays, liver elastography for diffuse liver diseases is a method used in daily practice, replacing many liver biopsies, at least in some areas. From the first Elastography Guidelines published by the European Federation of Societies of Ultrasound in Medicine and Biology (EFSUMB) [12], to National Guidelines (the Japanese or Romanian Guidelines on Liver Elastography) [13, 14] and ending with the recently published Guidelines of the World Federation of Ultrasound in Medicine and Biology [15], all these recommendations support the good results of ultrasound based elastographic methods for liver stiffness evaluation as a marker for fibrosis. More and more published papers on liver fibrosis consider TE as the reference method. At the same time, TE using CAP (Controlled Attenuation Parameter) is useful for quantitative assessment of liver steatosis (with an accuracy of approximately 80%) [16]. On the other hand, published studies and meta-analyses have demonstrated that point SWE and 2D-SWE seem to have a similar performance to that of TE. Thus, very soon, more elastographic validated methods will be available for use in daily practice. Their real advantages are that they are real-time methods, ultrasound guided, the results are obtained immediately, in less than 5 minutes and the evaluation of liver fibrosis can be done in a „point of care" setting.

Thus, answering the question in the title: where are we now in liver elastography with regard to diffuse liver diseases? We can say that some elastographic methods (point SWE or 2D-SWE) are in a process of validation. Very soon, all high-end ultrasound machines (and probably medium class devices too) will probably include modules for liver elastography. As a consequence, we will see a real decrease in the need for liver biopsy, especially in some of the liver diseases where very good and potent drugs have become recently available.

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