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DAILY RADIOLOGY NEWS

Medical Imaging International

Vol.25 No.6
11-12/2015
ISSN 1068-1779



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Shearwave Elastography: Noninvasive Alternative to Biopsies In Assessing Liver Damage

According to the Centers for Disease Control and Prevention, approximately 2.7 million persons in the United States have chronic HCV infection.¹ Assessing the degree of liver damage from the virus is an important step for patients who have a hepatitis C diagnosis, as the results of the assessment will contribute to decisions about treatment. ShearWave Elastography (SWE) offers a noninvasive alternative to biopsy for evaluating liver fibrosis, monitoring the disease, and following up after treatment. At each of these stages, using SWE is a cost-effective way to help avoid biopsy while glean- ing the necessary information quickly and without complications (including pain and discomfort for the patient).

The technology

SWE is a form of ultrasound elastography that uses fast-moving shear waves to determine tissue stiffness. It is distinguished from strain elastography in that shearwave elastography does not depend on an expert user palpating the tissue to achieve opti-

mal results; some SWE platforms automate the sonic “push” that gener- ates these waves, which are then cap- tured at speeds much greater than conventional ultrasound. SuperSonic Imagine (Aix-en-Provence, France), which pioneered the technique, received FDA clearance for its real- time, color-coded quantification of tissue elasticity in kilopascals (kPa), a display superimposed on a B-mode image for anatomical correlation.

Rise in demand

Studies have demonstrated the effec- tiveness of SWE for applications in- cluding breast imaging, imaging of the thyroid and prostate, and, more re- cently, in MSK diagnosis and monitor- ing as well. The clinical advantages of SWE for evaluating the liver have been the subject of larger studies over more time. These studies constitute a body of evidence that the World Fed- eration for Ultrasound in Medicine and Biology (WFUMB) used, along with practical advice from its con- tributing radiologist authors, to in- form their chapter in the *Guidelines*



Image: A patient demonstrates a F2/F3 Fibrosis of the Liver with ShearWave Elastography after treatment (Photo courtesy of Dr. James Trotter, Baylor University Medical Center of Dallas).

and Recommendations for Clinical Use of Ultrasound Elastography (2015) on the use of elastography to assess and manage liver diseases.² These *Guidelines* are timely in relation to two factors: the rise of liver disease globally, and the advances in treatment for hepatitis C specifically.

Newly developed oral medica- tions for hepatitis C are simpler to take, work more quickly, have fewer side effects, and have dramatically improved outcomes: with the new treatments, approximately 90% of hepatitis C patients are cured of the virus.³ The high cost of these oral medications remains an issue. Still, their efficacy and greatly reduced side effects have simplified the decision to treat the disease, which used to be a complex weighing of trade- offs for hepatologists. In 2014 the Centers for Medicaid and Medicare Services (CMS) made the determina- tion to cover HCV screenings for pa- tients at “high risk” for the disease, increasing efforts to uncover asymp- tomatic cases before they do dam- age.⁴ Greater outreach about and sur- veillance of the disease have thus dovetailed with the advances in the available medications. The ease of exam, accuracy of the results, and noninvasive nature of SWE make it a highly useful tool for evaluation in this new landscape.

Biopsies vs. SWE

While biopsies of the liver do not carry large risks of morbidity (and pose even less risk of mortality), they are costly, time-consuming, and their common complications are still bur- densome. Over 25% of patients un-

dergoing biopsy experience pain,⁵ and the procedures take several hours. An SWE scan is painless and can be done in less than two minutes in a radiologist’s office. Further, SWE can sometimes be used to circumvent biopsy’s sampling limitations; ultra- sound-guided imaging technology can help zero in on areas of interest in real time rather than risk the need for follow-ups due to sampling vari- ability or error (the liver is a large or- gan). Eliminating additional biopsies decreases the patient’s time in the clinic, which can direct resources to those who need them and improve clinical throughput.

SWE for follow-up

Even with 90% of hepatitis C patients being cured of the virus, the need for follow-up persists. The progress of those patients must be established, which in the past also required biop- sies. SWE can frequently substitute for this traditional use of biopsy, too. Additionally, with some of the more legible displays, SWE can visually demonstrate to patients the progress they’ve made. Comparing a current scan with one called up from an ear- lier visit can thus inform and educate the patient about their health.

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by Dr. James Trotter, Baylor Univer- sity Medical Center of Dallas



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