Editorial

Elastography-One Step Ahead

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Elastography is a new sonographic imaging technique which provides information about the elastic properties and stiffness of soft tissue.[1,2] Elastography- has received attention in recent years for it's non-invasive assessment of tissue mechanical properties. This procedure take advantage of changed soft tissue elasticity in various pathologies to yield qualitative and quantitative information that can be used for diagnostic purposes or know the status of the disease. For example, cancerous tumors will often be harder than the surrounding tissue, and diseased liver or breast are stiffer than healthy ones.[1-4]

Palpation is the practice of feeling the stiffness of a patient's tissues with the practitioner's hands. Manual palpation, however, have some important limitations: it is limited to tissues accessible to the physician's hand, it is distorted by any intervening tissue, and it is qualitative but not quantitative. Elastography try to address these limitations. It's tactile imaging (also called "Mechanical imaging", "Stress imaging" or "Computerized palpation") is a medical imaging modality that translates the sense of touch into a digital image.[5]

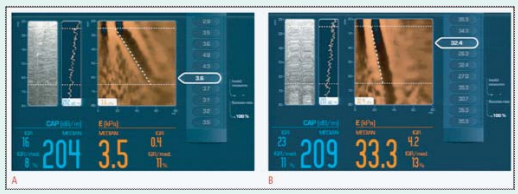
Techniques used for Elastography are ultrasound (US) or magnetic resonance imaging (MRI). Ultrasound-based methods are more appreciated due to its many inherent advantages, such as widely available - even at the bedside and relatively low cost. Several ultrasound elastography techniques using different excitation methods have been developed. In general, these can be classified into

- **strain imaging methods** (static elastography) that use internal or external compression stimuli,
- **shear wave imaging** (transient elastography) that use ultrasound-generated traveling shear wave stimuli[6] and
- **real-time tissue elastography** (color display of tissue elasticity).[7]

Elastography has the potential to increase examination specificity and diagnostic accuracy, thus reduce the need for diagnostic invasive procedures. This second generation technology, has proven applications in liver, breast, prostate, thyroid, kidney, lymph node and pancreatic disease. It allows more accurate localization and targeting of lesions, where diagnostic biopsy is indicated.

The World Federation for Ultrasound in Medicine and Biology (WFUMB) has produced the guidelines for the use of elastography techniques in liver disease. All the recommendations of the guidelines based on the international literature (all studies were conducted in developed countries) and the findings of the WFUMB expert group.[8]

Transient elastography (shear wave imaging) of a normal and a cirrhotic patient[9]



(A) healthy patient, the shear wave is relatively slow and the liver stiffness is low.

(B) patient with cirrhosis, the shear wave can propagate more rapidly though a hard tissue and the time-depth gradient is very steep.

Accurate assessment of the degree of liver fibrosis is important for estimating prognosis and deciding on an appropriate course of treatment for cases of chronic liver disease (CLD) with various etiologies. Liver biopsy has long been the gold standard to stage fibrosis in the liver. Because of the inherent limitations of liver biopsy i,e a liver biopsy samples only a very small piece of the liver, which can lead to incorrect staging, if this sample is not representative of the rest of the liver. There is a great need for non-invasive and reliable tests that accurately estimate the degree of liver fibrosis. Ultrasound (US) elastography is considered a non-invasive, convenient, and

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precise technique to grade the degree of liver fibrosis by measuring liver stiffness.[9]

Also, the test takes only 5—7 minutes to perform (entire appointment will last about 30 minutes), it is significantly less expensive than liver biopsy, and it has not been associated with any side effects. Finally, the results of the test are instantaneous, therefore clinicians can use them to make decisions during patients' visits. US elastography has been used not only to measure liver fibrosis but also to evaluate patients with portal hypertension, to assess recurrence of disease following liver transplantation and to predict survival in patients with liver disease.[10]

In addition, this technology is being used to evaluate patients with breast cancer, prostate cancer, and other diseases in which fibrosis plays an important role. But the main drawback of US elastography is that it cannot be performed in all patients. Technical limitations of the test preclude its use in patients with ascites, morbidly obese, and/or patients with large amounts of chest wall fat. In these groups, either the test cannot be performed or the results are not reliable.[8]

The another radiologic method for measuring fibrosis of different tissue is magnetic resonance (MR) elastography. The advantage of MR elastography is that it is very accurate for measuring stiffness. However, this test requires patients to undergo an MR imaging scan, and therefore it cannot be performed at the point of care and of course expensive. Acoustic resonance force impulse testing is another radiologic method for measuring fibrosis, but this method is still undergoing evaluation and has not yet been broadly adopted for clinical use either in the United States or Europe.[10]

At the end, a great news for us that now US elastography is available in our country at several private investigation centers of Dhaka city. Here US elastography is not expensive, cost is a little bit higher than usual ultrasonography. Hope it will be available all over the country very soon and both the clinicians and patients will appreciate the advantages of this simple non-invasive procedure.

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