ISSN NO: 2770-2936
August 2024

Breast ultrasound with elastography reduces the number of unnecessary biopsies

Lutpullaeva Aziza Mirkarimovna
obstetrician, gynecologist of the Republican Specialized Scientific and Practical Medical Center for Maternal and Child Health
Uzbekistan

Abstract. Ultrasound elastography (USE) is a tissue-stiffness-sensitive imaging technology that was first described in the 1990s. In recent years, it has been refined and refined to provide a quantitative assessment of tissue stiffness. Elastography techniques use altered elasticity of soft tissues as a result of certain pathological or physiological processes. For example, it is known that many solid tumors are mechanically distinct from the surrounding healthy tissues. Similarly, fibrosis associated with chronic liver disease causes the liver to become stiffer than normal tissue. Thus, elastography techniques can be used to differentiate diseased tissues from normal tissues for diagnostic purposes.

Keywords: Ultrasound elastography

Ultrasound elastography (USE) is a tissue-stiffness-sensitive imaging technology that was first described in the 1990s. In recent years, it has been refined and refined to provide a quantitative assessment of tissue stiffness. Elastography techniques use altered elasticity of soft tissues as a result of certain pathological or physiological processes. For example, it is known that many solid tumors are mechanically distinct from the surrounding healthy tissues. Similarly, fibrosis associated with chronic liver disease causes the liver to become stiffer than normal tissue. Thus, elastography techniques can be used to differentiate diseased tissues from normal tissues for diagnostic purposes.

The advantage of conventional ultrasound is that it is an inexpensive, versatile and widely available method that can be used at the patient's bedside. In recent years, ultrasound has been studied for several clinical applications and has been introduced into clinical practice for specific applications, such as the evaluation of liver fibrosis or the characterization of breast lesions. Elasticity visualization with ultrasound provides additional information to conventional ultrasound, adding rigidity as another measurable property to current ultrasound imaging techniques

The imaging community has been evaluating the use of breast elastography for more than 20 years. Breast elastography can be used to characterize benign or malignant neoplasms, to identify multiple neoplasms that may appear as a single neoplasm in B-mode, to assist in the characterization of complex neoplasms, to determine if the neoplasm is a lobule fat, whether the neoplasm is a benign cystic neoplasm, and to facilitate the selection of a tumor biopsy site.

There are 2 types of ultrasound elastography: compression elastography (SE) and shear wave elastography (SWE). These methods use different methods to determine the stiffness of tissues and are complementary. Each of them has its advantages and disadvantages. The choice of which one (or both) to use depends on availability, as well as which organ and disease are being evaluated.

Both p-SWE and 2D-SWE were used to assess breast lesions.

Guidelines recommending the use of elastography for the characterization of breast lesions have been published by the European Federation of Ultrasound Societies in Medicine (EFSUMB) and the World Federation of Ultrasound in Medicine and Biology (WFUMB). Both guidelines recommend adding elastography to conventional ultrasound to improve the characterization of breast lesions as benign or malignant. The WFUMB guidelines provide a detailed description of how to perform breast elastography,

Adding elastography to a standard breast ultrasound (screening or diagnostic) can be done in a few minutes. Both SE and SWE are highly sensitive and specific for the characterization of breast lesions. In the issue of the Journal of European Radiology, Xu et al. report the results of a large, prospective, multicenter study that evaluates the diagnostic efficacy of shear wave elastography in combination with standard breast ultrasound for the diagnosis of breast cancer. A total of 897 patients with a BI-RADS breast score of 3–5 underwent both B-mode breast ultrasound and shear wave elastography; histopathological assessment was carried out in

ISSN NO: 2770-2936
August 2024

patients with BI-RADS masses 4 or 5, as well as a 2-year follow-up in patients with BI-RADS masses 3 (with standard breast ultrasound in B-mode). Additional use of shear wave elastography was evaluated by hypothetically reclassifying participants into the appropriate BI-RADS categories. The results confirm that the majority of patients, 46%, receive (eventually) unnecessary biopsy based on B-mode ultrasound, as the histopathology appears to be benign. Hypothetically, the addition of 2D + 3D shear wave elastography reduces the proportion of benign biopsies compared to standard breast ultrasound by 54%. In particular, BI-RADS 4a was downgraded to BI-RADS 3 with a threshold of 90 kPa (= 5.5 m/s or less) and BI-RADS 3 masses were upgraded to BI-RADS 4a with a threshold of 120 kPa (= 6.3 m/s or greater); positive prognostic values (PPV) were 53.9% for B-mode breast ultrasound and 71.4% for shear wave elastography combinations. The proportion of missed malignancies was kept below the 2% threshold of the BI-RADS 3 category.

These results are consistent with two other promising multicenter studies. The multicenter BE1 study conducted by Berg et al. proposed thresholds for reducing BI-RADS 4a lesions at 80 kPa (= 5.2 m/s or less) and for increasing BI-RADS 3 lesions at 160 kPa (= 7.3 m/s or greater); there was an improvement in specificity with the same sensitivity (PPV 52.6% vs. 65.7%). A more recent prospective multicenter international study by Golatta et al. was unable to confirm the search thresholds of previous studies because the false-positive rate was reduced, but at the expense of an increase in the incidence of missed cancers. Secondary analyses suggest that lowering the grade of BI-RADS 4a at a cut-off of 2.55 m/s or less (= 19.5 kPa or less) may result in a 24% reduction in false-positive results (and therefore unnecessary biopsies) while maintaining cancer detection rates according to current recommendations. In contrast to these two previous studies, the study by Xu et al. is the first promising multicenter study to use 3D shear wave elastography. Although the reported diagnostic performance of 3D shear wave elastography is descriptively higher compared to 2D shear wave elastography, the reliability of the measurements is (currently) slightly lower. The study by Xu et al. adds to the growing body of evidence that breast elastography improves traditional breast ultrasound.

To date, no study has been able to prospectively confirm thresholds for increasing or decreasing suspicious breast masses, which are based solely on exploratory analyses conducted in retrospect (and which differ significantly among the three large studies mentioned above).

Bibliography:

1. Andre Pfob i Maykl Golatta European Radiology August 30, 2023
2. Breast Elastography – Ready for Premiere?
3. Djoy Liau, Axmed El Kaffas, Mariya Kristina Chammas, Yurgen K. Vilmann "Ultrasound Elastography: A Review of Methods and Clinical Applications" Digital Collection 2017.PubMed. Rosa MC Sigrist
4. Vaysman K. Methods of ultrasound elastography in breast cancer.Article.Epub. Radiologist. 2021 Feb;
5. Pet Bolduin Ultrasound elastography of the mammary gland Radiol Technol.2011 March-April
6. Panayotis Kapetas , Paola Klauzer , Ramona Voytek 1, Georg Dj. Vengert , Matias Lazar , Katya Pinker , Tomas X. Xelbix , Paskal AT Balser "Quantitative multiparametric ultrasound of the mammary glands: the use of contrast ultrasound and elastography leads to an improvement in the differentiation of benign and malignant neoplasms" Invest Radiol .2019 May
7. Zubarev A. V. Elastography is an innovative method of searching for cancer of various localizations. - 2009. - №4. - P. 32 - 37.
8. Abdullayeva, N. J. (2020). ISSUES OF REFORMING ACCOUNTING AND REPORTING IN THE PUBLIC SECTOR. Мировая наука, (4 (37)), 6-9.
9. Zykin B. I., Postnova N. A., Medvedev M. E. Ultrasonic elastography (review) // Medical alphabet. Diagnostic radiology and oncotherapy. - 2013. - No 1-2. - P. 4-19
10. Kapustin V.V., Kabin Yu.V., Gromov A.I. et al. Textbook. - Moscow, 2016.

ISSN NO: 2770-2936
August 2024

11. 1. Ultrasound elastography. From simple to complex - A. N. Sencha, E. I. Penyaeva, D. M. Shmelev. M.; 2023 Kabin, O. V. Kostash, A. I. Gromov et al. // Radiology - Practice. - 2019. - T. 76.- No 4. - P. 18-28.