Author’s response to reviews

Title: Elastography for the Diagnosis of High-Suspicion Thyroid Nodules Based on the 2015 American Thyroid Association Guidelines: A Multicenter Study

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Abstract

Background: An accurate diagnosis for high-suspicion nodules based on the 2015 American Thyroid Association (ATA) guidelines would reduce unnecessary invasive examinations. Elastography is a useful tool for discriminating benign and malignant thyroid nodules. The aim of this study is to investigate the diagnostic efficiency of elastography for high-suspicion thyroid nodules based on the 2015 ATA guidelines in the Chinese population.

Methods: Thyroid nodules with high-suspicion characteristics based on the 2015 ATA guidelines were subjected to conventional ultrasound (US) and ultrasound strain elastography (USE) examinations at 12 hospitals from 4 geographic regions across China. Cytology/histology of thyroid nodules was used as a reference method. Receiver operating characteristic (ROC) curves were plotted to evaluate the diagnostic performance of the elasticity score (ES) and strain ratio (SR). Logistic regression analysis was used to determine the predictors of malignancy.

Results: Overall, a total of 1445 thyroid nodules (834 malignant, 611 benign) from 12 centers were included in the final analysis. The areas under the curve of the ES and SR were 0.828 and 0.732, respectively. The sensitivity, specificity, accuracy, positive predictive value (PPV) and negative predictive value (NPV) of the ES were 92.4%, 60.7%, 79.0%, 76.3% and 85.5%, respectively, and
those of the SR were 81.1%, 50.1%, 68.9%, 65.9% and 67.9%, respectively. The combination of the Thyroid Imaging Reporting and Data System (TI-RADS) and ES led to a significant increase in the sensitivity and NPV (97.1% and 91.9%, respectively) compared with the TI-RADS alone. Logistic regression analysis showed that microcalcifications (OR=5.290), taller than wide (OR=12.710), irregular margins (OR=10.117), extrathyroidal extension (ETE; OR=6.412), the ES (OR=3.741) and the SR (OR=1.083) were independent predictors of malignant thyroid nodules. The sensitivity, specificity, accuracy, PPV and NPV of the ES were all superior in nodules ≥1 cm than in those <1 cm (95.0% vs 90.4%, 68.8% vs 56.8%, 85.9% vs 74.4%, 85.2% vs 69.9%, and 87.8% vs 84.2%, respectively).

Conclusions: Elastography combined with the ES is a valuable tool for the assessment of high-suspicion thyroid nodules based on the 2015 ATA guidelines, especially in nodules ≥1 cm.

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Ethics approval and consent to participate

The ethics committees of The Second Affiliated Hospital of Harbin Medical University, West China Hospital of Sichuan University, Sixth People’s Hospital Affiliated to Shanghai Communication University, First Affiliated Hospital of Xi’an Communication University, Xijing Hospital Affiliated to The Fourth Military Medical University, Third Affiliated Hospital of Kunming Medical University, Tumor Hospital of Beijing University, Xiangya Hospital of Central-south University, Tumor Hospital Affiliated to Xinjiang Medical University, Sun Yat-sen Memorial Hospital of Sun Yat-sen University, Beijing Anzhen Hospital Affiliated to Capital Medical University, and People’s Hospital of Guangdong Province approved this study. Informed consent for participation was obtained from all participants.

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