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Opinion Article

Clinical Significance and Diagnostic Potential of Transrectal Elastosonography

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DESCRIPTION

The field of medical imaging is constantly redefining diagnostic capabilities and treatment approaches *via* the incorporation of novel technology. Because of its potential for the detection and treatment of a number of medical disorders, most notably prostate cancer, Transrectal Elastosonography (TRES), a relatively new imaging technique, has attracted a lot of attention. TRES provides unique insights into disease pathogenesis by measuring tissue elasticity. This allows for more exact lesion location, personalized treatment strategies, and more accurate diagnosis.

Understanding transrectal elastosonography

An imaging technique called transrectal elastosonography combines elastography a technique for determining the elasticity or stiffness of tissue with traditional ultrasonography. In contrast to conventional ultrasonography, which generates pictures of anatomical structures by reflecting sound waves, elastosonography assesses how tissue deforms in reaction to mechanical stress from the outside. Elastosonography produces qualitative or quantitative maps of tissue elasticity by measuring the degree of tissue deformation or strain, which can help with the identification and diagnosis of a variety of diseases.

Clinical significance of transrectal elastosonography

Enhanced diagnostic accuracy: When combined with other imaging modalities like Computed Tomography (CT) and Magnetic Resonance Imaging (MRI), TRES provides additional information. TRES facilitates the distinction between benign and malignant lesions by measuring tissue elasticity, which enhances diagnostic precision and minimizes the need for pointless biopsies.

Improved lesion localization: Multifocal lesions inside the prostate gland are a common sign of prostate cancer. TRES makes it easier to locate worrisome lesions precisely using their elasticity patterns, which enables focused biopsies and exact measurement of the extent of the illness.

Risk stratification: The biological behavior of tumors is correlated with tissue stiffness; malignant lesions usually have more elasticity than normal tissue. Clinicians can evaluate the aggressiveness of prostate cancer and adjust treatment plans with the use of TRES-based risk stratification.

Treatment guidance: TRES supports patients with prostate cancer in their treatment planning and follow-up. TRES aids in maximizing treatment results and reducing the chance of disease progression by evaluating tumor response to therapy and identifying residual or recurring illness.

Diagnostic process with transrectal elastosonography

Patient preparation: Patients may receive instructions regarding bowel preparation and bladder emptying to optimize imaging quality.

Image acquisition: A transrectal ultrasound probe equipped with elastography capabilities is inserted into the rectum to visualize the prostate gland. Tissue elasticity is assessed using specific imaging modes, such as strain elastography or shear wave elastography.

Lesion identification: Suspicious areas within the prostate gland are identified based on abnormal elasticity patterns observed on elastosonography. These areas are further characterized and targeted for biopsy if deemed necessary.

Biopsy guidance: TRES-guided prostate biopsy involves the systematic sampling of suspicious lesions identified on elastography. Targeted biopsies are performed using ultrasound-guided needles to obtain tissue samples for histopathological analysis.

Interpretation and reporting: The elasticity maps generated by TRES are interpreted by experienced radiologists or urologists. Lesions with increased stiffness relative to surrounding tissue are

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considered suspicious for malignancy and may warrant further evaluation or treatment.

Advantages of transrectal elastosonography

Minimally invasive: TRES is performed transrectally, minimizing patient discomfort and reducing the risk of complications associated with invasive procedures.

Real-time imaging: TRES provides real-time assessment of tissue elasticity, allowing for dynamic evaluation during the examination and immediate feedback for clinical decision-making.

Improved visualization: By assessing tissue stiffness, TRES enhances the visualization and characterization of lesions, particularly in organs with complex anatomies such as the prostate gland.

Enhanced diagnostic yield: TRES-guided biopsies target suspicious lesions more accurately, leading to improved diagnostic yield and reduced rates of false-negative results.

CONCLUSION

A potential development in medical imaging, transrectal elastosonography provides novel insights into the elasticity and stiffness of tissue. TRES has the potential to transform the detection and treatment of many illnesses, especially prostate cancer, by improving diagnostic accuracy, enhancing lesion localization, and guiding treatment decisions. To fully realize the therapeutic potential of transrectal elastosonography and incorporate it into conventional clinical practice, more research, procedure standardization, and integration with new technologies are necessary.