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Testicular Ultrasound Elastography: An Evolving Technique

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Palpation to estimate the consistency or hardness of a lesion is a diagnostic method practiced in Egypt in 2600 BC [1]. Elastography assesses tissue elasticity [2]. It was introduced in the 1990s. It depends on a mechanical vibration that produces a shear wave into the tissues. The shear wave is followed by ultrasound to measure its speed, from which a modulus is figured out under hypothesis of homogeneity, isotropy, and elasticity [3]. There are two major types of ultrasound elastography, Strain Elastography (SE) and Shear Wave Elastography (SWE). In testicular strain elastography, the operator exerts manual compression with transducer. In Shear Wave Elastography (SWE) stress is generated by automatic shear waves rather than manual compression. It provides information regarding the stiffness of the tissue by tracking shear waves passing through them [4].

Testicular elasticity is inversely related to sperm parameters. In addition, strain study may correlate with sperm morphology and testicular volume. This is a noninvasive investigation of testicular tissue in infertile men [5]. Real-time elastography shows different areas with special stiffness in a color-coded image at the same time with the B-mode or grey scale image.. It was found that the elasticity pattern of a testis seems to be related to the volume and function [6]. Testicular torsion has higher stiffness determined by SWE. Stiffness and change in spermatogenesis can be evaluated with SWE [7].

As for tumors, lesions with diameters of <10 mm, particularly if they are not palpable, are negative for serum tumor markers, and if the findings from ultrasonography and color doppler ultrasonography are equivocal, the findings from sonoelastography might indicate the need for surgical exploration [8]. It has been shown that neoplastic lesions are harder than non-neoplastic lesions, and malignant neoplastic lesions are harder than neoplastic benign lesions. Assessment by tissue elastography as part of a multiparametric ultrasound examination increases diagnostic accuracy [9]. Real-time sonoelastography showed all testicular tumors as lesions with increased tissue stiffness. Because of its higher specificity, Real-time sonoelastography (RTE) can provide additional information in cases with undefined ultrasound findings [10]. Testicular microlithiasis (TML) increases stiffness slightly, but the range is within that of normal testicles. Increased velocity may indicate testicular malignancy, and elastography is a promising method for the assessment of testicular lesions [11]. In testicular cancer TC The combination of color Doppler US and Elastography can be used as primary imaging method, mainly on suspicion of benign lesions such as Epididymo-orchitis and in prepubertal testicular lesions [12].

Testes with varicocele are significantly stiffer than normal ones. All testes with testicular hypotrophy had grade 3 sonoelastographic scores. Sonoelastography can play a significant role in the evaluation of testicular elasticity as a predictive sign of testicular damage [13]. Onder showed higher stiffness values in testes with varicocele than in the contralateral testes and the testes of healthy male controls. In addition, testes of oligospermic patients had higher stiffness. He concluded that elastography plays a role in assessing the damage of testes resulting from varicocele [4]. There is much to come. Elastography was a research method used by a few institutions. Since 2005, increasing numbers of manufacturers have added elastography to their ultrasound systems. The new applications are in the early stages of research, but a few are developing into widespread applications in every day practice [14].

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