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LETTER TO THE EDITOR

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Salivary gland ultrasound elastography requires interpretation of "normal"

Strong support has evolved for elastography as a supplement to salivary gland ultrasound assessment.[1] We advocate for the clinical value of this tool but offer caution in considering "normal" shear wave velocity (also reported as Young's modulus) to consistently reflect normal gland function.

Standard ultrasound assessment of parotid tumors has been reported to identify malignancy with a 91% accuracy.[2] Jering et al. reported that additional evaluation with elastography improved the diagnostic accuracy by identifying malignant tumors to be associated with faster shear wave velocities and larger areas of stiff tissue than benign tumors.[3]

Assessments of non-neoplastic salivary disorders with ultrasound elastography have reported the capacity to discriminate between normal salivary glands with slower shear wave velocity from those in patients with Sjogren's syndrome with faster shear wave velocity.[4] Dai et al. through a meta-analysis of 15 articles addressing primary Sjogren's syndrome (pSS) concluded that ultrasound elastography "*demonstrates high accuracy in differentiating between pSS and healthy/disease control groups*".[5]

Chang and Wang identified their experience with ultrasound shear wave elastography to characterize glands affected with sialolithiasis.[6] Sequential assessments identified changes to gland stiffness following treatment of obstructive sialadenitis to further support the clinical utility of shear wave elastography as was similarly reported by a group in Munich, Germany.[7,8]

We concur with Chang and Wang's contention that the significant decrease in shear wave velocity they identified following stone removal does "*imply the diseased gland became softer after removal of sialolithiasis*" but offer caution in their interpretation that softening and slower speed reflects "*recovery of salivary gland function*."[6] Although others have similarly identified the value of elastography to "*indirectly reflect organ function*,"[5] it is important to acknowledge that fatty replacement of diseased glands may dominate the exam to provide a normal shear wave analysis of a poorly functioning or nonfunctioning gland.

Takagi et al. employed MR analysis to identify fatty degeneration occurring within the salivary glands of patients with long-standing Sjogren's syndrome.[9] Study of patients with post-irradiation xerostomia employing MRI and advanced CT imaging has also correlated poor salivary gland function associated with fat infiltration.[10] An elegant study of surgically resected human breast tissue identified a broad range of viscoelastic properties within the tissue subject to elastography analysis.[11] These investigators reported the modulus (stiffness) of fat tissue in the specimens to be significantly lower than that of glandular and fibrous tissue.

Our experience in examining patients following long-term injury from chronic salivary duct obstruction and from previous irradiation often identifies a slow ("normal") speed to elastography analysis in a way that correlates with fat replacement identified on CT imaging. This finding is highlighted by our report of a patient who had undergone parotid duct ligation with long-term follow-up identifying an elevated shear wave velocity in an infected tail of one parotid with normal velocity seen in the other parotid regions.[12] The normal shear wave velocity measurements correlated with CT assessment identifying parotid gland atrophy with fat replacement.

Advances in salivary ultrasound are occurring at a rapid rate and will benefit from efforts to standardize evaluation and reporting.[13] The addition of novel approaches to elastography coupled with advances in complementary approaches such as intravenous and intracavitary contrast enhanced ultrasonography (CEUS) will provide greater utility to salivary ultrasound evaluation.[14,15] Multidimensional ultrasound assessment coupled with deep learning offers promise to further enhance diagnostic capabilities.[16]

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