ULTRASOUND ELASTOGRAPHY- A NOVEL TOOL IN THE ASSESSMENT OF TEMPOROMANDIBULAR DISORDERS

Abstract

Ultrasound is an essential modality within medical imaging, predominantly for assessing soft tissues. Recently, the additional tool of ultrasound elastography has become commercially available for further assessment of tissues, in addition to the standard B-mode and Doppler imaging. The elastic properties of tissues are different from the acoustic impedance used to create B mode imaging and the flow properties used within Doppler imaging, hence elastography provides a different form of tissue assessment and possibly showing pathology before it can be detected on B mode imaging. This may be of particular use in the musculoskeletal system where there is a wide spectrum of tissue specialisation. Elastography assesses the strain (stiffness) of these tissues in response to stress, through a variety of different methods.14

The term elastography was described by Ophir *et al*15 as a method of portraying the strain properties of biological tissue. In strain, or compression elastography, a force (*i.e.*, stress) is applied from the transducer by repetitive manual pressure and the displacement (strain) is calculated from the return velocities of the tissues with respect to time. Measuring the displacement (strain) of the tissues secondary to an applied force (stress) gives a qualitative

map of the elastic modulus distribution, termed an elastogram. This elastogram is colour-coded and often super-imposed on a grey-scale B mode image for anatomical localisation. True quantitative measures cannot be taken from this elastogram, as the applied force is unknown. A semi-quantitative evaluation, however, can be determined from the ratio of the displacement of the tissue of interest and an adjacent structure, such as subcutaneous fat. This is measured in terms of Muscle elasticity index.16,17

This chapter highlights the application of ultrasound elastography for various Temporomandibular disorders.