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Review Article

SONOELASTOGRAPHY OF SOFT TISSUE BENIGN LIPOMAS

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A B S T R A C T

Sonoelastography has been used in imaging of the small parts in the last two decades. In this review we will demonstrate different types of elastography with special focus on its use by dermatologists to diagnose subcutaneous lipomas.

INTRODUCTION

High resolution ultrasound is a rapidly developing imaging tool for the diagnosis of different types of skin disorders. At the last 30 years it has been used as a simple and cheap diagnostic tool which could be utilized in the out patient clinic.(1)

Although magnetic resonance imaging (MRI) is an excellent tool for imaging the musculoskeletal system, however, its price, longtime of examination, and other factors like claustrophobia could all be obstacles for the dermatologist for requesting such type of study. (2)

In many cutaneous lesions the assessment of the stiffness diffuse and focal lesions could directly contribute to the next step of management as malignant tissues are harder than more benign lesions. (3)

The idea of elastography is based on studying the elastic properties of tissues. Its main idea depends on change of the elastic properties in tissue with different pathologies. The use of elastography is already well established now in the different parts of the body like the breast, thyroid gland , and the liver. More recently this technique was introduced to diagnose different musculoskeletal structures like nerves, tendons, and muscles. (3) Two main types of elastography are dominant at the current time.

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The stretch of tissue could be in a longitudinal fashion, or angular where is could be called "shear". These are measured by either Young's modulus or shear modulus. (4)

Strain elastography

The first one is the strain elastography, where light pressure is exerted, to give a pulse, and hence estimate the stiffness, this type is operator dependent, with no standardized measurements. This type only gives a rough idea about the tissue stiffness. (5)

Shear wave elastography

The other type is shear wave elastography, and depends on generating a pulse wave from the ultrasound probe to propagate through the tissue of interest. This type does not depend too much on the operator, and gives a more accurate measurement on the stiffness and it is measured in kilopascals. To ensure accurate measurement for shear wave elastography, the probe must be held stationary for 5-6 seconds, and the region of interest circle should be fixed. Each capture should contain minimum elasticity, maximum elasticity, and mean elasticity. A color map which differs between ultrasound companies is established with different colors, like blue, red, green and yellow representing different grades of stiffness, and then the stiffness is plotted with a range from 0-180. A main disadvantage of shear wave elastography difficulty to perform the procedure in a depth more than 9 cm. (6)

Although high resolution ultrasound could show different features of soft tissue lesions, yet, still pathological correlation is still needed in many instances. (4)

The echogenicity of lipomas depends on amount of fat, type and the water content of each lesion, (4). We think also that these three factors affect the stiffness of the lesions.

In the study done by Lee *et al*, (5) which used strain elastography, the elastographic features of lipomas were near to those of ganglia, however, different from dermal inclusion cysts and pilomatricomas. Also Lee *et al* reported that the stiffness of lipomas were very similar to the subcutaneous fat. In another study by Yeoh *et al*, (5) the mean shear modulus of epidermoid cysts was 23.7 kPa, 9.2 kPa for lipomas, and 5.8 kPa for ganlgion cysts. These results are rather logic, the content of ganglion cysts is the most viscous, and the content of the epidermoid cyst is more "thick" and thus more viscous. (7-9)

We believe that shear wave elastography could aid in the diagnosis of soft tissue lipomas which are unclear on conventional ultrasound, thus, giving strong suggestion of the stiffness of such lesions before considering biopsy.

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