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Comparison of Shear Elastography with Strain Elastography in imaging Renal Transplant Kidney

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Case Study: Elastography is emerging as a new tool for assessing transplant kidney. Usefulness of it in in evaluating graft dysfunction and fibrosis is still controversial.
AIM: To compare Shear and Strain Elastography in imaging renal transplant kidney.
METHODS: Stable Transplant recipients were imaged by single examiner using GE/USG machine. Sick, obese and those with skin to kidney depth above 3 cm were excluded. Mean of multiple readings from different regions were taken. Sinus tissue value taken as baseline for Strain readings. Unreliable Shear readings (IQR/MED >30) were discarded. Statistical methods using SPSS software applied to study correlations and significance.
RESULTS: 47 patients aged 7 to 71 yrs; post transplant duration 15 days to 3 yrs; creatinine 0.9 to 11 were studied. Readings ranged from 0.9 to 8.7 by Strain and 4.5 to 40 kpa by Shear elastography.
DISCUSSION: Elastography estimates the stiffness/elasticity of tissues. Useful in differentiating benign from malignant mass lesions in superficial organs like breast, thyroid and prostate. Transplant kidneys placed superficially (unlike native kidneys) are amenable for elastography. Literature quotes usefullness in assessing fibrosis and differentiating causes of graft dysfuntion in transplant kidneys. Renal structure being heterogenous with cortex, medulla, pyramids, vessels and calyces does not lend itself easily for interpretation by elastography. Presence of multiple elastography techniques like strain, shear, transient, futher compound the confusion. Although there was positive correlation between strain and shear, it was weak(Pearson correlation- 0.10). 19 out of 47 studies had unsatisfactory Shear readings. Although Shear technique is recent, is not as reliable as Strain elastography. More technical refining is warrented.
CONCLUSIONS:
1. Stiffness of kidney measured by Strain and Shear elastography show only weak positive correlation.
2. No correlation between serum creatinine, post transplant duration and elastography.
3. Shear elastography with more variable and unreliable readings appear less reliable than Strain.

Descriptive Table

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
AGE	43	7	71	38.42	14.428
CREAT	47	.9	11.2	2.226	1.9817
DURATION	47	.5	312.0	54.426	83.3966
STRAIN	47	.9000	8.7000	2.917021	1.7776779
SHEARMEAN	47	8.0600	50.8600	18.237660	8.7558714
SHEARRELIABLE	28	4.50	29.90	17.4550	7.54285
Valid N (listwise)	26				

Pearson Correlation - Strain vs Shear

Descriptive & correlations using only reliable measurement

Descriptive Statistics

	Mean	Std. Deviation	N
RATIO	2.536	1.4428	28
SHEMEAN	18.3807	9.82697	28

Correlations

		RATIO	SHEMEAN
RATIO	Pearson Correlation	1	.101
	Sig. (2-tailed)		.610
	N	28	28
SHEMEAN	Pearson Correlation	.101	1
	Sig. (2-tailed)	.610	
	N	28	28