SHEAR WAVE ELASTOGRAPHY IN KIDNEY TRANSPLANTATION: NON-INVASIVE ALTERNATIVE TO ALLOGRAFT BIOPSY?

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TOPIC: RENAL TRANSPLANTATION - EXPERIMENTAL

INTRODUCTION AND OBJECTIVES

Renal allograft biopsy is the gold standard for the detection of histological lesions of chronic allograft dysfunction. The identification of a non-invasive routine test would be desirable. Elastosonography is used to assess tissue stiffness according to viscosity, and no data are available on the use of point quantification shear-wave elastography (ElastPQ) for the evaluation of renal chronic lesions. The aim is evaluating the feasibility of ElastPQ to assess cortical allograft stiffness and determine the correlation of clinical, biological and pathological factors with the diagnostic accuracy of kidney stiffness (KS) values in patients with histological lesions.

METHODS

Forty-two patients underwent kidney transplant biopsy and 10 valid measurements of ElastPQ, blindly performed by two operators. The ElastPQ measurements and the clinical data were compared using the Spearman correlation analysis.

Demographic, laboratory and ultrasound characteristics	p	Histological Characteristics	p
BMI	NS	Interstitial inflammation (i)	NS
Recipient Age	NS	Tubulitis (t)	NS
Donor Age	NS	Glomerular inflammation (g)	NS
Recipient eGFR	NS	Arterial inflammation (v)	NS
Donor eGFR	NS	**Interstitial Fibrosis (ci)**	**0,021**
Recipient Creatininemia	NS	**Tubular Atrophy (ct)**	**0,034**
Donor Creatininemia	NS	**Transplant Glomerulopathy (cg)**	**0,016**
Proteinuria	NS	**Mesangial Matrix Increase (mm)**	**<0,001**
Time since transplant	**0,002**	Arterial fibro-intimal thickness (cv)	NS
Cold ischemia time	NS	Arteriolar hyalinosis (ah)	NS
Resistive index	NS	**IF/TA score (ci+ct)**	**0,014**
Skin-graft distance	NS	Acute histological changes	NS
Cortical Thickness	NS	**Sum of Chronic histological changes**	**0,028**

Table 1. Correlation between the stiffness measurements and the patient characteristics and histological parameters

RESULTS

97.6% reliable measurements were obtained using ElastPQ, with an excellent interobserver agreement and high correlation between the measurements of the two operators (r=0,892; p<0,001). The kidney stiffness was significantly higher in the patients with time since transplantation over 12 months and was correlated with chronic histological lesions (interstitial fibrosis, tubular atrophy transplant glomerulopathy and mesangial matrix).

Kidney stiffness correlated with the IF/TA (interstitial fibrosis and tubular atrophy) score and the sum of the scores of the chronic lesions differently from acute lesions (Table 1). In the multivariate analysis, the only variable that correlated independently with kidney stiffness was the moderate/severe increase in matrix mesangium, dichotomized according to Banff Classification (absent/mild versus moderate/severe) (Figure 1). The corresponding AUC value for the mesangial matrix increase stage 2/3 was 0.902 (95%CI: 0.807-0.997). The best cut-off value was 39.7 kPa.

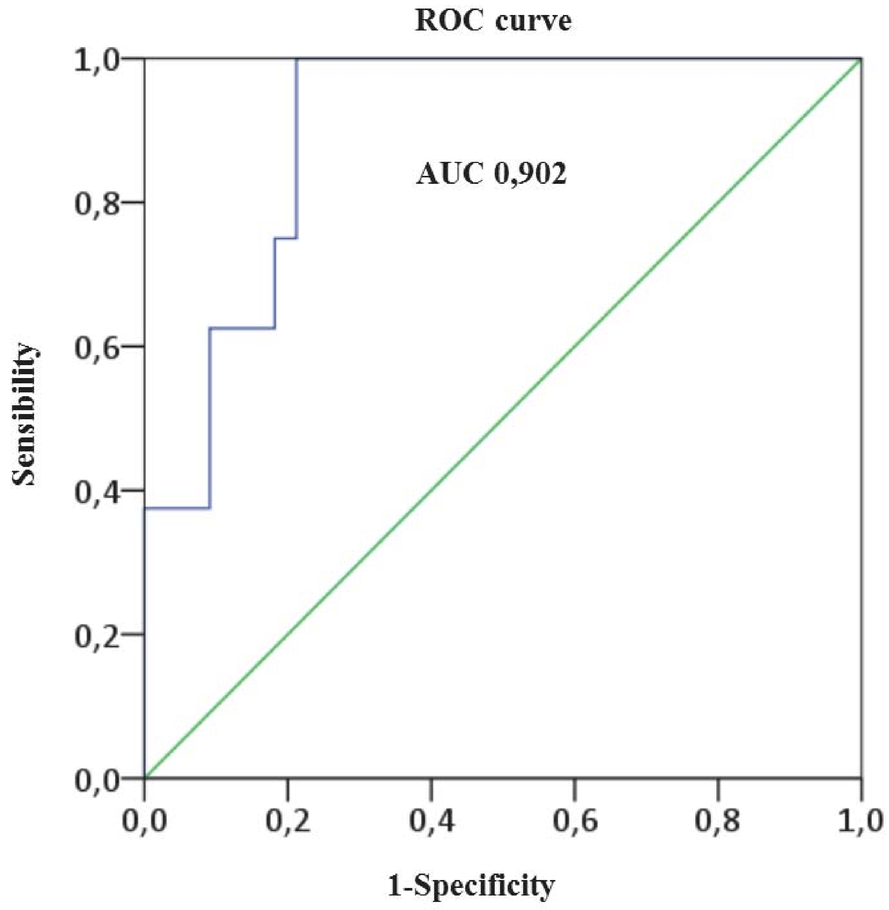

Figure 1. Receiver operating characteristic (ROC) curve for the mesangial matrix increase.

CONCLUSION

In conclusion, ElastPQ is a valid, non-invasive, reproducible and sensitive diagnostic tool to detect moderate/severe chronic mesangial matrix increase. The stiffness appears to be non-specifically related to the fibrotic or atrophic lesions in the renal transplant. The routine use of ElastPQ for follow up can reveal chronic histological lesions, minimizing interventions of immunosuppressive treatments and selecting patients eligible for biopsy, which remains the gold standard examination for detecting chronic allograft dysfunction and do not miss acute histological lesions, as interstitial inflammation, overlapped.

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Renal transplantation - experimental
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