Echographic Valuation of Risk Factors for Cardiovascular Disease in Patients With Renal Transplantation

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CARDIOVASCULAR disease is the major cause of morbidity and mortality among patients with end-stage renal disease.[1] After renal transplantation, patients exhibit accumulation of cardiovascular risk factors such as influence of immunosuppressive therapy.[2] Smoking, hypertension, diabetes, fibrinogen, and low-density lipoprotein (LDL) cholesterol are widely accepted coronary heart disease risk factors. These risk factors are also associated with preclinical atherosclerosis, generally measured as the intima media thickness of carotid arteries by B-mode ultrasound.[3–5]

A recent study[6] has shown that increases in intima-media thickness of carotid artery (TCA) are directly associated with an increased risk of myocardial infarction and stroke in older adults without a history of cardiovascular disease.[6]

The aim of our study has been to evaluate TCA in renal transplant recipients under 50 without cardiovascular diseases and traditional cardiovascular risk factors.

MATERIALS AND METHODS

We examined 86 renal transplant (RT) recipients from day hospital for the presence of cardiovascular risk factors, and 57 of these patients were selected for this study. We collected clinical and biochemical data for each patient. The patients have been separated in tree groups: (A) all patients studied; (B) no-risk patients (without traditional cardiovascular risk factors and cardiovascular diseases); and (C) at risk patients. Those in groups B and C were 50 years and older.

The carotid examinations were detected and evaluated by a single physician with high-resolution B-mode ultrasonography and were begun in October, 1999. We used B-mode ultrasound imaging with 7.5 MHz transducers giving an axial resolution of 0.2 mm. The subject was in a supine position on a bed. First, the common carotid artery (CCA) and internal carotid artery (ICA) were examined along three different longitudinal plane axes (anterior-oblique, lateral, and posterior-oblique). Second, the IMT was measured on a longitudinal scan of the CCA at a point of 10 mm proximal from the beginning of the dilatation of the bulb. We defined a plaque as an area where IMT was >1.10 mm. We calculated three measures of internal carotid artery and one of common carotid artery bilaterally, then we considered the maximal thickness observed for every patient (TCA).

The distance between the medial adventitial border and the luminal intimal border represents the IMT. The maximal IMT has been correlated with age, sex, TR age, HD age, total cholesterol, triglycerides, total dose of cyclosporine, and steroid (total dose is calculated by two means of values recorded, for each years of transplant) by multiple regression test. Student's t test has been applied to the groups and $P < .05$ was considered significant.

RESULTS

The Mean ± SD of characteristics studied of 86 recipients are reported in Table 1. The patients have been separated in A, B, and C groups. No significant differences were observed between groups A and B (except lipid factors, because of selection).

In all groups, we observed a significative correlation of TCA with age. In the no risk patient group (B), a signifi-

Table 1. Group Characteristics

	M/F	CIMT	Age at Tx	Age	HD Years	Tx Age	sCr	Chol	Trig	CyA	sCyA	Ster
Patients (86)	26/30	0.928	39.326	43.584	4.26	4.360	1.679	227.80	174.50	196.290	145.86	5.531
Mean ds		0.238	11.400	11.356	4.09	3.899	0.739	45.03	104.30	108.000	108.56	4.536
No risk (20)	11/9	0.915	38.182	43.030	5.04	5.000	1.736	200.80	113.00	182.570	118.33	4.848
Mean ds		0.228	12.486	12.680	4.21	4.213	0.886	31.86	25.82	130.870	115.45	5.180
Risk (37)	23/24	0.935	40.000	43.911	3.81	3.982	1.646	243.80	210.80	204.370	162.08	5.933
Mean ds		0.245	10.784	10.606	3.99	3.689	0.644	44.24	115.800	92.289	101.87	4.106
t test		0.701	0.488	0.738	0.18	0.254	0.614	0.000	0.000	0.404	0.076	0.309
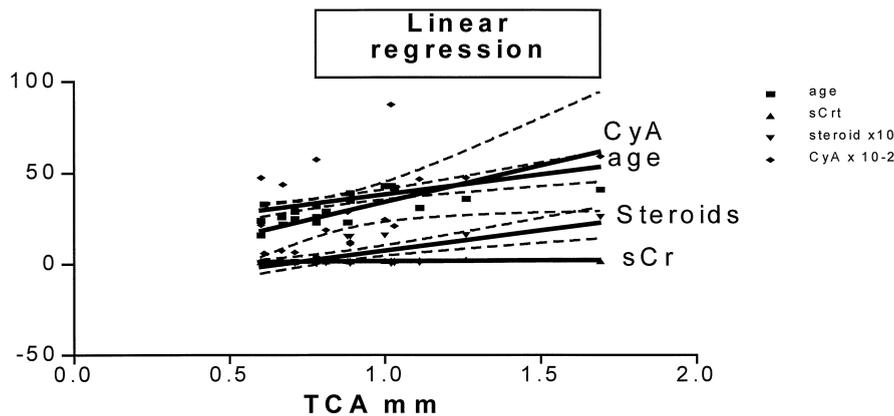
Fig 1. Significant linear regression of age, creatinine (sCr), and cyclosporine (CyA) and steroid doses.

cative linear correlation of creatinine, and steroid and cyclosporine doses was noticed (Fig 1).

DISCUSSION

RT recipients have an increased incidence of cardiovascular disease. The risk estimation factors are enumerated. It is difficult elucidate the influence of immunosuppressive therapy and/or uremic clinical status.

Public health tends to careful screening to identify persons at high risk. Heiss et al.[3] observe that using B-mode ultrasound arterial wall thickening and atherosclerotic changes are observed directly and measured: atherosclerosis cases are unlikely to have been misclassified. Noninvasive B-mode ultrasonographic measurement of intima-media carotid thickness is used as an endpoint in epidemiologic studies and clinical trials to gauge progression and regression of atherosclerosis.[4,5] An important multicenter study demonstrated that all persons in affluent societies develop atherosclerosis but not all develop clinical symptoms.[7]

O'Leary et al.[6] observed that when statistical adjustment was made for traditional cardiovascular risk factors, TCA remained a significant predictor of cardiovascular events.

In an initial study, our preliminary results deduced by the ultrasonographic application evidenced a cardiovascular risk factor in 49 RT recipients and showed significant correlation of TCA with age and CyA dose. In this study we examined 89 RT recipients. We observed in 20 patients (under age 50) selected for absence of cardiovascular risk factors and diseases a significant linear regression of TCA with age, creatinine, and CyA and steroid dose.

RT patients' in absence of traditional risk factors for atherosclerosis, show a different TCA, which represents own artery status. The increase in thickness is a finding of worsening atherosclerotic lesion. Young adults and middle-aged people with vascular disease commonly have higher total cholesterol levels, but the apparent effect of cholesterol on vascular disease wanes after the age of 50, and almost disappears after 65.[8] In our study, groups B and C are homogeneous for characteristics considered (the sole significant difference is cholesterol and thriglicerid levels, because of selection). Even if we select patients under 50, we observe in groups B and C a linear correlation of TCA for age. No significant difference was observed in TCA values considering risk and no risk patients.

The no risk group was selected for absence of traditional cardiovascular risk factors and diseases. It is interesting the significative correlation of TCA with creatinine and steroid and CyA doses.

Measurements of carotid artery thickness are as strong predictors of events as the traditional risk factors. After adjustment for conventional risk factors, the combined measure of intima-media thickness of the carotid artery is the variable most strongly associated with the risk of cardiovascular events.[6] It is accepted that atherogenic lesion is a worsening factor of graft nephropathy in RT recipients.

Atherosclerotic risk factors may be the greatest challenge to further improve the longevity of patients with successful renal transplant.[9]

This study provides data that underline the importance of individual adjustment of immunosuppressive therapy in RT patients to improve their atherogenic risk. It seem reasonable to limit steroid and CyA doses in patients with good graft function in the early posttransplant period. Treatment of risk factors must be effective and introduced early in the course of renal failure and continued following transplant. Although the obtained results are poor, they confirm the need for careful control of atherosclerotic risk linked to therapeutic modulation.

A screening strategy based on the rate of intima-media thickness progression could be a rational approach to prevention (and evaluation of drug action) of cardiovascular disease in RT patients.

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