African Journal of Nephrology (1998) 2:21-23

AJN

Original Article

Hyperechogenic renal parenchyma in potential live relalted kidney donors: Does it justify exclusion ?

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Abstract: The aim of this work is to asses the importance of ultrasonic grade I echogenicity in potential kidney donors in the absence of urinary abnormality and with perfect renal function.
Thirty four living related kidney donors with this abnormality were included, age range between 23-48 years. Ten matched healthy donors were studied as controls.
All cases were thoroughly investigated including measuring GFR by isotopic scan and estimation of renal reserve by dopamine and aminoacid infusion.
Renal biopsy was done for 17 cases of the echogenicity group and 8 controls. Our results showed that the renal reserve was comparable in both groups. Glomerular changes were found in 41% of apparently normal donors and only one case of controls.
Conclusion: Grade I echogenicity may be singe of unrecognised kidney disease. Renal biopsy is mandatory when such related donors are the only available

Introduction

For many years the relative reflectivity of the renal cortex compared to that of the adjacent right lobe of the liver and the spleen was used to indicate normality of the kidney and the diagnosis of diffuse renal disease [l].

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This was based on the assumption that normal renal cortex has reflectivity less than that of adjacent organs. This concept remained current even in recent literature [2]. More recently these views have been challenged by suggesting that grade I renal cortical echogenicity can occur in normal kidneys and may be absent in a large proportion of those patients with active renal disease [3]. Considering the above data we evaluated the importance of grade I echogenicity in potential living related kidney donors.

Materials and methods

Of 700 potential living kidney donors were evaluated during the last six years (92-97), 34 were found to have grade I echogenicity. These donors were subjected to the following:

1. Thorough history taking and clinical examination.
2. Laboratory assessment including (a) repeated urine analysis (b) renal profile (serum creatinine, creatinine clearance, sodium, potassium, calcium and phosphate and uric acid dctermation) for assessment of kidney function.
3. Radiological assessment including repeated renal ultrasound by at least two different senior radiologists.
4. Glomerular filtration rate (GFR) was measured by Meta-acetyl glutamine 3 (MAG3) scans.
5. The renal functional reserve was then estimated by simultaneous infusion of dopamine (2.5 ug/kg/min.) and 10% of the multiamino acid preparation Vamin N® (80ml/hour). During the procedure a diuresis of at least 100 ml/hr was

maintained with oral fluids. After six hours of combined dopamine and aminoacid infusion, when the GFR has reached its maximum, isotope clearance was measured by MAG3 scans. The renal functional reserve was calculated by comparing the clearance values done by isotopic scan before and after the infusion of dopamine and aminoacids.

6. Kidney biopsy, was done for those who had no other related donors available (17 cases). All specimens were examined by light microscopy (LM) , immunofluorescence (IF) for 12 cases and electron microscopy (EM) for only 2 cases.

A matched control group (10 cases) of healthy kidney donors with normal sonographic appearance of kidneys were also similarly assessed. Kidney biopsies were taken just before transplanting the allograft in eight cases.

Results

Thirty four potential living related donors were found to have grade I renal parenchymal echogenicity inspite of normal urine analysis and perfect renal function. The characteristics of these donors are summarized in Table 1.

GFR was estimated by isotope clearance. Both groups were evaluated by performing the functional renal reserve after simultaneous infusion of dopamine and aminoacid preparation. The increase in the GFR in response to the infusion was comparable in both groups (Table 2).

Table 1. Characteristics of donors

Age (year)	32.65 ± 8.45
Sex (M/F)	27/7
Consanguinity	
- parents	3
- sibling	1
- brothers	21
- sisters	4
- husband	1
- wife	1
- cousin	1
Creatinine (mg/dl)	0.91 ± 0.15
Cr. clearance (ml/min)	114.6 ± 11.92

Table 2. Effect of infusion of dopamine and amino acids on GFR (ml/min) in both groups (isotope clearance)

Group	*GFR (ml/min) Mean ± SD*		*Function reserve % **
	Basal value	Value after infusion	
Echogenicity	118.16 ± 14.31	133.66 ± 13.0	18.1 ± 5.3
Control	127.3 ± 11.24	137.6 ± 2.08	15.5 ± 7.7

* P: 0.52

Kidney biopsies were done for 17 cases of the echogenicity group and 8 cases of controls. The renal specimens were examinated by LM, IF (12 cases) and EM (2 cases of the echogenicity group).

Minor glomerular changes were found in 7 cases in the group with grade I echogenicity and in only one case of the control. Table 3 shows details of the histopathology in these cases.

Table 3. Histopathological data

Case	*Glomerular*	*Tubular*	*Interstitium*	*I/F*	*E/M*
1	Sclerosis (1/8)	N	N	- ve	-
2	Mes. Thick. (+) **	N	N	IgA +++	-
3	N ***	Focal (+) artophy	N	-	-
4	Mes. Thick. (+)	N	N	- ve	-
5	N	N	Fibrosis (+)	IgM + ve	-
6	N	N	N	IgM + ve	- ve
7	N	N	N	IgM + ve	-
8*	Mes. Thick (+)	N	N	-	-

Control *, Mesangial thickening **, Normal ***

Discussion

Shortage of organs due to the lack of a cadaveric program and the insistence of these strongly motivated persons to donate their kidneys, were stimulating to carry this work to study the possible unrecognized kidney disease among this particular group of donors.

We previously reported the problem of asymptomatic microscopic hematuria in potential living related donors and it was found to denote a significant kidney disease. We concluded that these cases should not be considered as suitable kidney donors even if strongly motivated [4].

The significance of ultrasonographic finding of grade I echogencitiy in apparently healthy donors is not clear.

One study reported that the relative echogenicity of the cortex was found in 96% of their cases. However, using newer sonographic technology with dynamic focusing in transmission and reception, one group have found an almost equal number of patients whose renal echogenicity was equal to that of the liver as those with cortical echogenicity less than that of the liver [3].

Our results showed a comparable GFR levels as estimated by isotope clearance in the group with grade I echogenicity and controls. Moreover, the response of the kidney to infusion of dopamine and aminoacids was similar in the two groups; both groups had significant increases in GFR. The estimated mean functional reserve was 18.6% for the echogenicity group and 15.5 % for controls. These results are similar to that of Bosch et al. [5] and greater than that of Tapson et al [6] indicating that grade I echogenicity does not adversely affect renal function.

In an attempt to correlate the sonographic findings of grade I echogenicity with renal pathology, kidney tissues were examined in the group with increased echogenicity and controls.

Renal biopsies were studied with LM, IF and EM. The samples were taken just before transplanting the allograft kidney in the control group. Minor glomerular changes were found in 7 cases in the group with grade I echogenicity and in only one case of controls (Table 3). Our results were closely similar to Rosenberg et al. [7]. They described the morphological findings in 70 kidneys of living donors for renal transplant. Kidneys were studied with LM, IF and EM. Glomerular changes were found in 35.7% of cases: 9 cases showed relative glomerular ischemia with an irregular basement membrane without antecedents of hyperglycemia; in one case (1.4%) there was a lesion similar to type I mesangiocapillary glomerulonephritis with C3 ++, IgG ++, IgA + and IgM +ve; in another case (1.4%) there were scant isolated C3 glomerular, sub epithelial deposits with indentation of the basement membrane and micro-hematuria which was present only after donation and in 9 cases (among them two pairs of siblings) there were mesangial IgA and mesangial electron-dense deposits compatible with Berger's disease (12.9%) none of these glomerulopathies was evident under LM.

Living related kidney donation is encouraged by most kidney transplantation centers [8] and in our center it represents more than 90% of our transplants.

Ethically, the donor risks and the benefits to the recipients must be considered. So, every effort should be made to be sure that donors must be free from any renal disease.

We can conclude from this study that grade I echogenicity may be of value in donor selection as it may be a sign of unrecognized kidney disease. When these donors are the only available for donation, renal biopsy must be considered.

In the presence of histopathologic findings exclusion of these donors must be done irrespective of the degree of changes or the extent of motivation.

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