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SPECIAL ARTICLE

The Consequences of Chronic Kidney Disease Mislabeling in Living Kidney Donors

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Abstract

Despite numerous studies that substantiate its long-term safety, barriers to kidney donation persist. These include issues of insurability after donation and its consequent financial and emotional burdens. We present 2 cases in which mislabeling of kidney donors as having chronic kidney disease shortly after kidney donation adversely affected their insurability. A concerted effort should be made to affect public policy such that insurability and the psychosocial well-being of living donors are protected.

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We report the cases of 2 kidney donors who experienced problems with insurance coverage after donor nephrectomy. Both our cases were mislabeled as having chronic kidney disease (CKD) shortly after donation. We review the misuse of creatinine-based glomerular filtration rate (GFR) estimation equations and the CKD classification system in the living kidney donor population and discuss its negative consequences.

Case 1: A 56-year-old man was denied life-insurance coverage after donation. He underwent evaluation to donate his kidney to his friend of 15 years. His medical history was remarkable for gastroesophageal reflux disease, depression, and idiopathic hypogonadism. Previous operations included nasal septoplasty, tonsillectomy, cholecystectomy, and excision of a squamous cell carcinoma. Regular medications include omeprazole, sertraline, and testosterone. He was normotensive on 3 separate blood pressure (BP) measurements, and the remainder of his examination was normal. Laboratory studies revealed serum creatinine (S_{Cr}) of 1.2 mg/dL (to convert to mmol/L, multiply by 0.0259) and 24-hour creatinine clearance of 96 mL/min per 1.73 m^2. He had no hematuria or proteinuria. Results of all radiologic studies were normal. He was subsequently approved for kidney donation and underwent laproscopic donor nephrectomy. He was discharged on day 3 with an S_{Cr} of 2.0 mg/dL. Six months later, he reported being in perfect health and was noted to have a BP of 131/84 mm Hg, an S_{Cr} of 1.9 mg/dL, and a urine albumin-creatinine ratio of less than 30 mg/g. After his visit, he followed up with his primary care physician, who referred him to a nephrologist for stage 3 CKD on the basis of his estimated GFR. Soon after this, when he changed jobs, he was denied life insurance solely on the basis of abnormal renal function on laboratory tests performed by the insurance company. A letter from the insurance company specified that no other abnormalities on physical examination or laboratory studies were found. He sought a second opinion, at which time an iothalamate urinary clearance test revealed a clearance of 71 mL/min per 1.73 m^2. He was reassured that this was normal for a healthy living donor. A letter explaining the lack of kidney disease in this individual was written to the insurance company. Despite this appeal, he was again denied insurance coverage and he did not pursue the matter further. Two years after donation, he remains active, normotensive, and healthy with an S_{Cr} of 1.7 mg/dL.

Case 2: A 58-year-old white woman's health insurance premium was increased shortly after kidney donation. She initially presented as a prospective kidney donor for her sister. Among family members tested for histocompatibility, she was the only 2-haplotype match. She had mild essential hypertension well controlled on amlodipine 5 mg/d for 6 years; otherwise, her medical history was unremarkable. Her physical examination result was normal. The 24-hour BP monitoring found that she had an average BP of less than 120/80 mm Hg. Her S_{Cr} was 0.8 mg/dL and corrected 24-hour creatinine clearance was 99 mL/min per 1.73 m^2. She had no proteinuria or hematuria. Ultrasound and computerized

tomography results were normal. She was well educated, well informed, and expressed fear over potential consequences after donation because she did not wish to be perceived as unhealthy. She was given extensive counseling and multiple opportunities to decline donation, but she was resolute on proceeding despite her fears. In addition, she was counseled that after donation, her S_{Cr} might increase to a level that may misclassify her as having CKD.

She underwent an uncomplicated laproscopic donor nephrectomy and was discharged on day 3 postoperatively with an S_{Cr} of 1.5 mg/dL. Six months after the operation, she returned to the clinic for follow-up and reported feeling well except for mild fatigue. Her BP was well controlled at 118/87 mm Hg on the same dose of amlodipine. Her S_{cr} was 1.1 mg/dL, and urine albumin-creatinine ratio was less than 30 mg/g. Her health insurance premium increased shortly after kidney donation, as she was told that she now had CKD. She was able to afford the modest increase in her premium, but she now suffers from considerable anxiety about her health.

Both patients had an iothalmate-based GFR measurement[1] at 6 months after transplant. The Table contrasts the results of the iothalmate-based GFR and the 3 most commonly used creatinine-based GFR equations in both cases. The Figure illustrates the distribution of GFR (measured by iothalamate clearance) in 79 kidney donors within 1 year of donation. The GFRs of both cases described fall within the second and third quartiles of healthy living donors, respectively.

DISCUSSION

There are 2 components to CKD mislabeling in living donors. First, the CKD classification system was developed to stratify persons with true CKD into categories that reflect the risk of complications.[2] However, the reduction in GFR associated with unilateral donor nephrectomy is not a progressive disease process and, unlike CKD, is not associated with an increased risk of end-stage renal disease (ESRD), adverse cardiovascular outcomes, or death when compared with the general population.[3-7]

Second, the use of GFR estimation equations in living donors frequently results in underestimation of GFR and misclassification of donors as CKD stage 3 or over soon after donation. The most commonly used and now widely adopted estimating equations for GFR are the Modified Diet in Renal Disease and Chronic Kidney Disease Epidemiology Collaboration equations. Both equations are creatinine-based formulations that were derived to best estimate ^{125}I-iothalamate clearances in a population of binephric patients with true CKD (mean GFR, 38 mL/min).[8,9] Severe limitations of their reliability in healthy kidney donors have been well described.[10,11] Both equations tend to overestimate the GFR in patients with true CKD and, in contrast, underestimate the GFR in living kidney donors.[11] Indeed, GFR underestimation with estimating equations is particularly pronounced in older living kidney donors, like our cases.[10] A greater muscle mass in the living donor population may contribute to the underestimation of the GFR by serum creatinine—based equations compared with the CKD population, in which protein restriction and muscle atrophy are commonplace.[12]

Given the preponderance of data to support the relative safety of kidney donation in healthy persons,[6,7] it is troubling that insurability has become a concern for some donors. Yang et al[13] estimated that 2% to 4% of living organ donors have concerns over insurability and 3% to 11% of donors actually encountered difficulties with their insurance. However, the same group performed a follow-up "undercover" telephone survey of Canadian insurance companies and found no evidence of discrimination against previous kidney donors.[14] Donor concern about long-term financial well-being is not limited to insurability. Many costs such as accommodation, caregiver support, and loss of earnings during the perioperative and convalescent periods are not covered by the recipient's insurance and can be substantial.[15-17] Up to

TABLE. Comparison of Estimated and Measured Glomerular Filtration Rates

Formula	Case 1 (mL/min per 1.73 m^2)	Case 2 (mL/min per 1.73 m^2)
MDRD	39	51
CKD-EPI	37	55
Cockcroft-Gault (mL/min)	53	50
Iothalmate	71	62

CKD-EPI = Chronic Kidney Disease Epidemiology Collaboration; MDRD = Modified Diet in Renal Disease.

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