To Accept or Except

Metabolic Syndrome Screening for Living Kidney Donor Candidates

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Introduction

End-stage renal disease (ESRD) is a serious medical condition currently affecting 600 000 people in the United States alone.¹ Contributing broadly to increased morbidity and mortality, ESRD costs the US health care system almost \$50 billion annually.¹ For the many Americans with ESRD, kidney transplantation provides a greater survival benefit and quality of life than any dialysis option.² Unfortunately, while the transplant waiting list grows each day, the rate of kidney transplantation has plateaued. Many centers have sought to bolster kidney supply by increasing living kidney donation, partly by accepting organs from medically complex individuals that may have been rejected in previous eras. Sadly, these efforts have been insufficient. Of the 100 000 patients on the waiting list, fewer than one-fifth received a kidney in 2015.³ Currently, the median wait time for those who do receive kidneys is more than 4 years.¹

Many centers have addressed the organ gap by expanding their living donation program because

there is a potential for a steady supply sufficient to meet increasing demand, and living kidney donations results in superior outcomes to deceased donation.⁴ Surgical mortality from the donor procedure is extremely low—the 90-day postoperative mortality rate is 3/10 000,⁵ and kidney donation does not appear to contribute to long-term mortality at 15-year follow-up.^{6,7} Nevertheless, questions remain regarding the long-term safety of donation in specific populations. Notably, many centers now accept individuals with metabolic syndrome (MetS).⁸ There is evidence that MetS, a known risk factor for cardiovascular disease, predisposes an individual toward chronic kidney disease (CKD)^{9,10} and ESRD.¹¹ While living donors in general have a low absolute risk of developing ESRD,^{12,13} there may be a higher relative risk in donors than nondonors,^{7,14} suggesting that patients at an already-elevated risk should not bear the increased risk of donation. In this light, some centers have begun

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excluding MetS patients from donating a kidney. In this report, we seek to identify the consequences for those candidates' recipients.

Methods

We conducted a retrospective review of the electronic medical records for every obese (body mass index [BMI] ≥ 30.0) donor at our center between March 13, 2009, when our center began screening obese candidates for MetS, and December 31, 2014. Screening, and all subsequent analysis, was done using the National Cholesterol Education Program (NCEP) ATP III definition (3+ of BMI ≥ 30.0 , serum triglycerides > 150 mg/dl, serum high density lipoprotein [HDL] < 40 mg/dl for men and < 50 mg/dl for women, blood pressure [BP] $> 130/85$ mm/hg, fasting plasma glucose > 100 mg/dl, confirmed by 2 hr oral glucose tolerance test > 140 mg/dl). All donor candidate evaluations were reviewed by a single researcher. Sociodemographic variables, including age, BMI, sex, and race, were obtained, along with clinical variables including blood pressure, blood glucose, serum creatinine, lipid levels, and HDL cholesterol. At our center, each candidate is evaluated by a multidisciplinary committee. Our chart review scored each candidate by the committee's decision to accept or rule out a candidate for kidney donation. For the candidates rejected, the committee's reason was recorded. For the patients rejected because of MetS, a follow-up review of their intended recipients' electronic medical record was conducted to determine whether they were alive, if they had received an alternative kidney, and if so, whether their donor was living-related, living-unrelated or a deceased

donor. This study was approved by our center's Institutional Review Board.

Results

Four hundred thirty-four obese donor candidates evaluated for kidney donation were identified. Of those candidates, 69 potential donors were excluded for MetS since screening began in 2009. Of those candidates, 27 (39%) had their intended recipient receive a transplant since their donor evaluation. Thirty-six (52%) have recipients who are currently waiting, and 6 (9%) died before transplant (Table 1).

Conclusion

Once we began MetS screening, we identified and ruled out many individuals with the condition from donating. Unfortunately, 61% of the individuals hoping to receive a transplant from those donor candidates have not yet received a kidney, 9% of which have died while waiting. Data from our own center have demonstrated that, after controlling for sociodemographic differences, our center saw a substantial decrease in its acceptance rate for obese donors between the pre-MetS screening era and after, but after correcting for clinical factors, there was no change in how race, age, or gender affected the donor acceptance rate following policy implementation.¹⁵ That finding suggests that many of the donor candidates excluded because of MetS would have been allowed to donate without such screening and that their intended recipients would therefore have received their transplants.

For a MetS candidate, donating a kidney may exacerbate his or her already-increased likelihood of developing CKD and progressing to ESRD. Many

TABLE 1. Recipient Outcomes for Donor Candidates With Metabolic Syndrome

	Total Potential Recipients	Received Living Do- nor Kidney	Received Deceased Donor Kidney	Did Not Receive Kidney, on Dialysis	Did Not Receive Kidney, not on Dialysis	Died Before Transplant
N	69	15	12	30	6	6

of the negative outcomes that might affect a donor with MetS, including CKD and ESRD, are chronic conditions that may manifest decades after the donation procedure and may not have been captured in the studies touting kidney donation's remarkable safety. At the present time, there have been no conclusive long-term studies on the outcomes of living donors with MetS. However, there is reason to doubt the safety of donation in this population. At the same time, our report highlights the impact on those donors' intended recipients. Without a transplant, those individuals have borne the burden of chronic dialysis therapy, and several have died. Evaluating the impact of MetS screening requires a consideration for both patients—the MetS candidate who, without screening, may expose him- or herself to an increased ESRD risk by donating and the intended recipient who, with screening, may die waiting for another donor to provide a kidney.

Our study is limited by its inability to compare its results to those before screening was implemented. At our center, there were insufficient data from before screening was implemented to determine which individuals had MetS at the time of their donation. Because of that, we cannot compare our results to those of earlier donor evaluations from our institution. This study is the first such report on a MetS screening program, and thus there is no literature comparing other centers' results with screening for MetS. Nevertheless, there are far more adults with MetS today than ever before—recent estimates suggest that more than one-third of all Americans fit MetS criteria,¹⁶ and this trend is echoed in the donor population.

The Mayo Clinic analyzed the past 40 years of their living donor program and reported that donors have gradually become older with greater BMIs, mimicking national demographic trends.¹⁷ While historically there has been inconsistency between centers¹⁸ on evaluation criteria for kidney donors, the growing prevalence of MetS may lead other institutions to consider adopting a similar screening policy. As we collect more data on intraoperative and postoperative complications, weight loss recommendation success, time from evaluation to donation, prior data on MetS incidence among our kidney donor population, and recipient kidney function, we hope to provide more specific recommendations on the effectiveness of the screening policy at mitigating donor risk, the testing characteristics of the screening, and on best practices that other centers could use to inform their own MetS screening policies.

This report detailed our center's experience with MetS screening. While there is growing evidence that kidney donors with MetS are at an increased risk for developing ESRD and requiring a transplant themselves, more stringent requirements for donor candidates have resulted in consequences for their intended recipients. Future research should focus on quantifying the risk of ESRD in kidney donors with MetS. As the rate of MetS increases, other centers will increasingly contend with the difficult choice of how to best protect the health of donors in the midst of an increasing gap between organ supply and demand. We hope that our experience with MetS screening will help guide other centers as they look to refine their selection criteria for living kidney donors.

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