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Predicting Cardiac Prognosis in Asymptomatic Chronic Kidney Disease Patients

We read with interest the recent study by Winther et al. (1) that addressed the best noninvasive or invasive test for predicting cardiac prognosis in asymptomatic chronic kidney disease (CKD) patients. In this study, 154 patients referred for kidney transplantation assessment underwent coronary artery calcium score, coronary computed tomography angiography, single-photon emission computed tomography, and invasive coronary angiography and were followed up for a mean of 3.7 years. The primary endpoint was major adverse cardiac events (MACE) defined as 1 of the following events: cardiac death, cardiac arrest with successful resuscitation, ST-segment elevation myocardial infarction, non-ST-segment elevation myocardial infarction, or coronary revascularization. The secondary endpoint was all-cause mortality. Coronary artery calcium and abnormal coronary computed tomography angiography and invasive coronary angiography findings were predictive of MACE even after adjustment for renal transplantation and presence of more than 3 risk factors during follow-up.

This study is important, as patients with advanced renal failure have a high cardiovascular risk and cardiovascular mortality accounts for one-half of all deaths in patients with end-stage renal disease receiving dialysis (2,3). Furthermore, although renal transplantation significantly improves survival, cardiovascular disease is still one of the most frequent causes of death accounting for 35% to 50% of all-cause mortality (4). All current screening options have some limitations and there is no consensus about the optimal mode of screening.

The study raises some important questions that require clarification. First, it appears that the treating clinicians were not blinded to the results of the study investigations. Hence, patients who had revascularization procedures in relation to the baseline cardiac evaluation do not appear to have been excluded from follow-up, and these patients (5%) are counted as part of MACE outcome. This is inappropriate and artificially increases the number of MACE events. Second, we are not informed if medical therapy was altered as a result of the study investigations. Third, the units for the laboratory findings are not given, and we are surprised by the very low levels of mean hemoglobin in their population (7.3 g/dl).

Finally, we would like to mention other noninvasive methods of evaluation for coronary artery disease that are being currently studied in the renal failure population. Blood oxygen level-dependent (BOLD) cardiac magnetic resonance (CMR) uses the paramagnetic properties of deoxygenated hemoglobin as an intrinsic contrast and can thus directly indicate the oxygenation status of the myocardium. The BOLD CMR technique can be particularly useful in CKD participants, as it has a high sensitivity to detect myocardial ischemia, and does not involve exposure to radiation or extrinsic contrast agents. In a recent study, BOLD CMR demonstrated significant blunted myocardial oxygenation response to stress in asymptomatic CKD patients (5), and may have prognostic value.

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THE AUTHORS REPLY:

We thank Dr. Selvanayagam and colleagues for their valued comments on our paper, which investigated the prognostic value of clinical risk factors and a variety of cardiac imaging modalities in kidney transplantation candidates (1). Our study was designed to evaluate the diagnostic accuracy of noninvasive imaging techniques, coronary artery calcium score, coronary computed tomography angiography, and single-photon emission computed tomography compared with invasive coronary angiography (ICA). The cardiologist performing the ICA was blinded to the noninvasive imaging technique, and the stenosis severity was determined by blinded quantitative coronary angiography analysis (2). If a visually significant stenosis was present and accessible for revascularization at the ICA, the single-photon emission computed tomography results were unblinded for the cardiologist performing the ICA. Subsequently, all images were unblinded for clinicians. The study follow-up period was started after the ICA. We agree that this frequently used design has some limitations. First, the revascularization might have altered the patient prognosis according to both the noninvasive and invasive diagnostic tests results performed at baseline. However, a sensitivity analysis excluding revascularized patients (7 of 154 included patients) showed that exclusion did not alter our results. A second limitation is that clinicians might have altered medical treatment based on the noninvasive or invasive test results. We acknowledge that our study does not allow registration of such changes and its impact on outcome.

We apologize for the missing units of the laboratory findings (Table 1) and can inform that all values are presented in SI units. The specified values and units are hemoglobin 7.3 ± 0.8 mmol/l, albumin 38.1 ± 5.0 g/l, calcium 1.2 ± 0.1 mmol/l, phosphate 1.6 ± 0.4 mmol/l, and C-reactive protein 5.8 ± 9.4 mg/l. Hence, hemoglobin is in line with other studies of kidney transplantation candidates. These units are added to the primary manuscript by the publisher.

Finally, Parnham et al. (3) highlight explorative data regarding the impact of kidney disease on blood oxygen level–dependent cardiac magnetic resonance assessing myocardial tissue oxygenation. We agree that these data are interesting and future studies should clarify the diagnostic accuracy and prognostic value in patients with kidney disease.

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