PD vs 1.65 mmol/L. n = 8,327 in HD). This provides the largest available body of evidence to also support the letter by Noordzij et al. [3] on the differences in serum phosphate in these patients. In addition, we have analysed a subset of patients who changed modality from PD to HD and showed that serum phosphate rose by 0.2 mmol/l in these patients (www.renalreg.org) [4]. This indicates that the difference in phosphate achievement in these two dialysis groups is related to the dialysis modality and is not a ‘patient factor’.

Renal registries are publishing regular analyses on these and many other topics and although not peer reviewed, are often overlooked as a source for routine analyses of data on renal replacement therapy patients.

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Advance Access publication 18 October 2006

**Value of the real-time myocardial contrast echocardiography for risk stratification and for the detection of significant coronary stenosis in patients with end-stage renal disease**

Sir,

Coronary artery disease (CAD) is common in patients with end-stage renal disease (ESRD), and is associated with poor clinical outcome. However, routine screening for CAD in asymptomatic ESRD patients is usually not required, except for renal transplant candidates [1]. Myocardial contrast echocardiography (MCE) is a new bedside technique providing information regarding myocardial tissue perfusion. The assumption that MCE might be useful in patients with ESRD has not been previously investigated. Moreover, there are no published data concerning prognostic utility of MCE in patients with ESRD.

The aim of the study was to assess the prognostic significance of MCE in patients with ESRD, and to evaluate the efficacy of MCE in the detection of significant CAD.

Between January and September 2005, real-time MCE was performed on 44 consecutive patients (15 women), mean age 56±15 years on regular haemodialysis (HD) as a screening test for CAD. Twenty-three among them (all of them with a history of chest pain) underwent coronary angiography. Echocardiographic examination including MCE was performed on the same day prior to angiography, using Sonos 5500 (Phillips), equipped with harmonic imaging and S3 transducer (2-4 MHz).

Baseline regional wall motion score index (WMSI) and left ventricular ejection fraction (LVEF) were derived. Real-time MCE was performed using low mechanical index (MI: 0.1). The ultrasound contrast agent Optison (Amersham, USA) was administered via a peripheral vein. This contrast agent consists of perfluorocarbon filled microbubbles with a median diameter of 3–4 μm. The dose of 1 ml for each echocardiographic view was followed by 10 ml saline flushed through. The dysfunctional area was visualized using harmonic imaging in either four or two chamber view.

Perfusion assessment was qualitative. Adequate myocardial perfusion was scored when the segment showed homogeneous opacification in at least one view. Lack of opacification was scored as low myocardial enhancement and regarded as myocardial perfusion defects. Left ventricle (LV) was divided into three regions of perfusion supplied by three main coronary arteries: left anterior descending (LAD), circumflex artery (Cx), right coronary artery (RCA), respectively.

Selective coronary arteriography was performed using standard techniques. Coronary artery stenosis >75% was defined as significant.

The study complies with the declaration of Helsinki. Protocol was approved by a local ethics committee, and informed consent was obtained from all subjects participating in the study.

Patient characteristics are shown in Table 1.

Two episodes of cardiac arrest (CA) due to ventricular fibrillation, successfully treated, were observed shortly after coronary angiography, both in patients with perfusion defects on MCE. Among 44 examined patients with ESRD, 26 (65%) demonstrated perfusion defects on MCE. Demographic, clinical and laboratory parameters were compared between the groups with (and without perfusion disturbances). Composite clinical end-point included cardiac death, CA, acute myocardial infarction, myocardial revascularization, hospitalization for cardiac cause and stroke over 6-month follow-up.

The patients with perfusion defects on MCE in comparison with those without perfusion disturbances were older (65±14 vs 54±11 years, P = 0.009), had lower EF (49±5 vs 59±12%, P = 0.002), higher WMSI (1.3±0.3 vs 1.0±0.2, P = 0.0084). During FU, 15 out of 44 patients (34%) reached composite end point. Thirteen of them (87%) demonstrated perfusion defect on MCE (chi-square test, P = 0.009).

Multiple linear regression analysis was performed to predict composite end point. Perfusion disturbances in the region of LAD (BETA =-0.51, P = 0.003), lower EF (B =-1.41, P = 0.023), higher BMI (BETA = 0.86, P = 0.02) were associated with poor clinical outcome.

**Table 1. Patients characteristics**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Study group, n = 44 patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>56±15</td>
</tr>
<tr>
<td>Sex</td>
<td>29 man; 15 women</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>26.3±9.4</td>
</tr>
<tr>
<td>ESRD cause</td>
<td>16 GN; 13 DM; 15 other</td>
</tr>
<tr>
<td>Dialysis duration (months)</td>
<td>47±4.3</td>
</tr>
<tr>
<td>Hypertension (%)</td>
<td>44 (100)</td>
</tr>
<tr>
<td>Diabetes (%)</td>
<td>24 (54.6)</td>
</tr>
<tr>
<td>Hyperlipidaemia (%)</td>
<td>35 (80)</td>
</tr>
<tr>
<td>History of MI (%)</td>
<td>9 (20.5)</td>
</tr>
</tbody>
</table>

DM, diabetes mellitus; ESRD, end-stage renal disease; GN, glomerular disease; MI, myocardial infarction.
Among 23 patients who underwent coronary angiography, 12 (52%) had perfusion defects on MCE. Significant CAD was revealed on angiography in 10 (43.5%) patients: in 4 (17.4%) single-vessel and in 6 (26.1%) multi-vessel disease. To investigate diagnostic performance of MCE in detection of significant coronary lesion, we performed a vessel-based head to head comparison with coronary angiography for three different regions supplied by LAD, Cx and RCA respectively, in every patient. Results are exposed in Figure 1. Altogether we did not notice false negative MCE results. The sensitivity of MCE for detecting significant coronary stenosis as well as negative predictive value was 100% for the three investigated regions. Specificity and positive predictive value were the lowest for LAD: 72 and 50%, while for Cx were 81 and 70% and for RCA 83 and 62.5%, respectively.

MCE enables investigation on myocardial tissue perfusion, as well as the spatial extent of microvascular obstruction. MCE has previously been validated as the reference technique for evaluation of myocardial perfusion, particularly in the setting of myocardial infarction [2,3]. To our knowledge, this report is the first to apply MCE in patients on HD for this purpose. Contrast media applied for MCE contain high-molecular-weight gases exhaled, not eliminated by kidneys, thus not contraindicated in patients with renal failure. In our opinion, two episodes of CA were eliminated by kidneys, thus not contraindicated in patients with renal failure.

Impaired myocardial perfusion was detected in as much as 65% of our patients. Compared with those with normal perfusion, patients with perfusion abnormalities were at higher risk for cardiovascular events despite a short FU time. Prognostic value of echocardiographic and nuclear imaging techniques in ESRD patients was largely investigated, but with non-uniform results. However, Rabbat et al. [4] in a meta-analysis concerning prognostic utility of two techniques of myocardial perfusion assessment (thallium scintigraphy and dobutamine stress echocardiography) found that both are useful in predicting future myocardial infarction or cardiac death in patients with ESRD.

Coronary angiography confirmed significant coronary stenoses in 10 out of 23 patients, while perfusion disturbances in MCE were detected in 12. Thus, agreement between MCE and coronary angiography in a patient-by-patient analysis was good (no disease) with a tendency of MCE to overestimate the severity of CAD.

Our preliminary results indicate that MCE is an uncomplicated and safe method of perfusion assessment in patients with ESRD at a bedside. MCE results might be useful for risk stratification in HD patients. MCE seems to be a valuable tool in predicting the presence of significant coronary artery stenosis in patients with ESRD.

Conflict of interest statement. None declared.


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Advance Access publication 12 September 2006

Mycotic pseudoaneurysms in a CAPD patient

Sir,

We report a case of a 49-year-old male with prior history of membranous glomerulonephritis, who had been on haemodialysis since 1991. He had received two kidney transplants (1992 and 1994), losing both due to relapse of the underlying disease. In 1994 he was placed on a peritoneal dialysis (1992 and 1994), losing both due to relapse of the underlying disease. In 1994 he was placed on a peritoneal dialysis programme.

In June 2004, he was admitted with fever and an umbilical hernia, and leakage of the peritoneal fluid was observed as was a small mass in each inguinal area. Culture of the peritoneal fluid showed Staphylococcus aureus and Enterococcus faecalis. Haemocultures were negative. Intravenous meropenen and intraperitoneal vancomycin and tobramycin were administered. Forty-eight hours later, both masses presented rapid growth. An eco-Doppler examination revealed bilateral pseudoaneurysms in both external iliac arteries, that were...