Cardiovascular complications of renal failure in hemodialysis patients

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Introduction

Cardiovascular problems are responsible for about 60% of mortality rate in patients with end stage renal disease under hemodialysis (1). Accelerated atherosclerosis is indeed more common in these patients compared to the normal population. Moreover, chronic inflammation may be an important risk factor of atherosclerosis, so inflammatory markers such as interleukin-6 (IL6) and C-reactive protein (CRP) could increase in hemodialysis patients (2). Duration of chronic kidney disease (CKD) or hemodialysis also may be a risk factor of cardiovascular and mortality in these patients (3). Diabetic nephropathy is cardinal cardiovascular risk factor in CKD and hemodialysis patients. Some other cardiovascular risk factors in these patients would be secondary hyperparathyroidism and high Ca×P product, chronic hypertension, hyperlipidemia, long term anemia, large weight gain between dialysis sessions, uremic milieu, and high cardiac output due to arteriovenous fistulae. Hypertrophy of left ventricle and left ventricular dysfunction are shown poor prognostic factors that could increase morbidity and mortality in hemodialysis individuals (4).

National Kidney Foundation has recommended the baseline and periodic cardiac monitoring using echocardiographic for dialysis patients (5). One of the common echocardiographic abnormality in dialysis patients, even in patients with normal ejection fraction, is left ventricular hypertrophy (LVH) (6). In CKD patients, stepwise increase in LVH and deterioration of cardiac function (left ventricular ejection fraction; LVEF) with progression of renal failure from stage 3 to stage 5 was reported. With initiation of renal replacement therapy, left ventricular mass index may be decreased compared to prior to dialysis probably due to the improvement of venous congestion. Diastolic dysfunction, atrial dilation, valvular calcification and pericardial abnormality were also reported more common in hemodialysis patients (7). In echocardiographic findings of 60 hemodialysis patients, we found mitral regurgitation (MR), tricuspid regurgitation (TR), and aortic insufficiency (AI) in 54 (90%), 47 (78%), and 11 (18%) patients, respectively (9).

Long-term effect of hemodialysis on left ventricular function has not been well understood. In the study on hemodialysis patients after 12 months, we found that LVEF decreased significantly compared to the beginning of the study despite the acceptable adequacy of hemodialysis (10).

There are a few studies about the long term changes of echocardiographic findings in hemodialysis patients. In the study on 22 hemodialysis patients, LV systolic functions and RV diastolic functions did not significantly change after 2 years follow-up (11).
Conclusion
Long-term decreasing of LVEF in the hemodialysis patients may be due to negative effect of uremia on cardiac function, continuation of LVH, atherosclerosis, anemia and hyperparathyroidism in majority of the patients. It seems that additional studies with large sample size and long-term follow-up would be necessary to clarify on this subject.

Author’s contribution
AM is the single author of the manuscript.

Conflicts of interest
The author declared no competing interests.

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References