中文題目:左心室收縮時期縱向形變在穩定透析患者合併 正常左心室射出分率之預後預測的應用

英文題目: Left ventricular systolic longitudinal strain predicts prognosis in stable hemodialysis patients with preserved left ventricular ejection fraction

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Background: End-stage renal disease is notorious for high mortality because of cardiovascular diseases. Identifying the indicators of high cardiovascular risk is important for managing dialysis patients. Symptomatic heart failure and asymptomatic left ventricular (LV) systolic dysfunction are recognized as predictors of adverse prognosis in dialysis patients. For asymptomatic hemodialysis patients with preserved left ventricular ejection fraction (LVEF), little is known regarding the prognostic predictors. Two-dimensional speckle-tracking echocardiography with myocardial deformation analysis (2D strain) is reliable to assess LV function accurately and objectively. We hypothesized that subtle abnormalities of LV myocardial deformation (strain) are associated with prognosis in this population. The prospective study was conducted to investigate prognostic value of LV global peak systolic longitudinal strain (GLS) in asymptomatic hemodialysis patients with preserved LVEF.

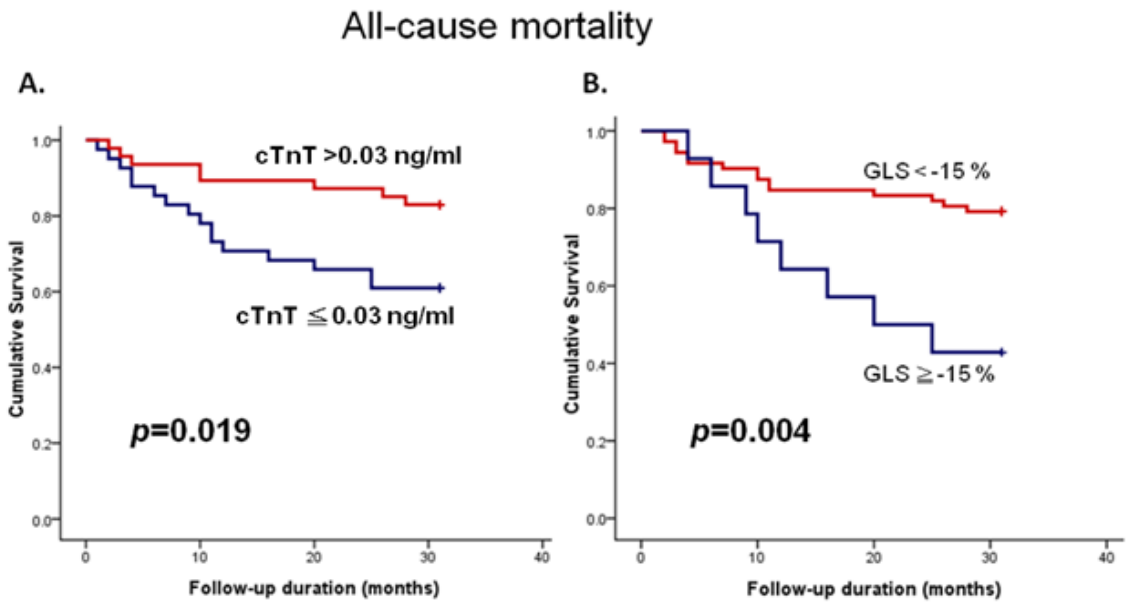
Methods: One hundred and twenty ESRD patients from two community hospitals (≥18 years of age) receiving a maintenance hemodialysis program, three times per week over 3 months, were prospectively screened. We enrolled 109 patients who were willing to participate in this study. The exclusion criteria were (1) >80 years of age, (2) LVEF <50%, (3) episode(s) of HF presenting with pulmonary edema in the past 6 months, (4) acute coronary syndrome in the past 6 months, (5) chronic atrial fibrillation, (6) moderate or severe valvular heart disease (including mitral/aortic regurgitation or stenosis), and (7) inadequate echocardiography image quality. Twenty-one patients were excluded, and 88 patients were included in the final analyses. These patients were followed-up for more than 2.5 years. All patients presented with anuria and received an adequate dose of hemodialysis (average Kt/V 1.71±0.23; hemoglobin 10.2±1.2 mg/dL, and cardio-thoracic ratio on chest X-ray 52±5%). Asymptomatic hemodialysis patients with LVEF≥50% underwent biochemistry blood tests, echocardiography, and 2D strain analysis. The primary outcome was all-cause mortality, and the secondary outcomes were cardiovascular death, ischemic events (including admission as a result of angina and coronary re-vascularization), and hospitalization for heart failure.

Results: The enrolled patients were stratified into two groups: survival and mortality. There were no significant differences in high-sensitivity C-reactive protein (hs-CRP), interleukin-6, and plasminogen-activator inhibitor type 1 levels between the mortality and survival groups. The mortality group had a higher rate of prevalent coronary artery disease (CAD) and

diabetes mellitus and higher cardiac troponin T (cTnT) levels but had lower albumin levels and fewer patients undergoing angiotensin-converting enzyme inhibitor (ACEI) or angiotensin II-receptor blocker (ARB) therapy.

Lower albumin levels, deteriorated GLS, and higher cardiac troponin T (cTnT) levels were detected in the mortality group compared to the controls. In Cox regression model, reduced GLS (GLS≥-15%, Hazard ratio (HR): 1.26, p=0.002) and increased cTnT level (cTnT >0.03 ng/ml, log cTnT HR: 14.43, p<0.001) were predictors to all-cause mortality (Figure A and B). Furthermore, hemodialysis patients with reduced GLS, but not those with increased cTnT level, had higher cardiovascular mortality rate (Table 4 and Figure C and D). Patients with cTnT >0.03 ng/ml and GLS ≥-15% had 7.8 times the risk of all-cause mortality and 6.1 times the risk of cardiovascular death compared to those with cTnT ≤0.03 ng/ml and GLS <-15% (Table 5).

Conclusions: Among asymptomatic hemodialysis patients with preserved LVEF, increased cTnT level and reduced GLS were associated with worse prognosis. Compared to cTnT, GLS is a stronger prognostic indicator in asymptomatic hemodialysis patients. The incremental prognostic value of GLS with elevated cTnT is potentially efficient and reliable.



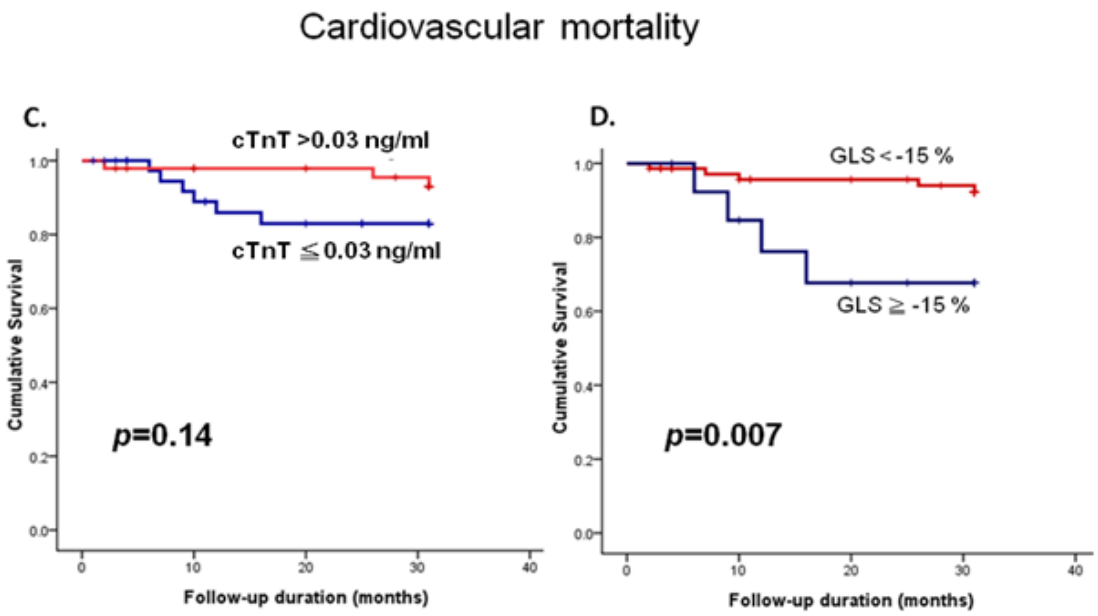


Table 4. Prognostic values of hsCRP, albumin, cTnT, and GLS for predicting cardiovascular death in asymptomatic hemodialysis patients with preserved left ventricular ejection fraction

	Uni-variate Cox analysis	
Cardiovascular death	HR (95% CI)	*p* value
hsCRP (mg/dL)	0.94 (0.58-1.53)	0.81
Albumin (g/dL)	0.64 (0.97-5.8)	0.69
Prescription of ACEIs / ARBs	0.09 (0.01-0.89)	0.02
Prevalent CAD	4.41 (1.10-17.7)	0.04
Diabetes mellitus	1.41 (0.38-5.27)	0.61
LV EF (%)	0.92 (0.82-1.02)	0.12

log cTnT	5.24 (0.76-36.4)	0.09
GLS (%)	1.25 (1.03-1.52)	0.03

Table 5. Prognostic values of combinations of cTnT, and GLS for predicting all-cause and cardiovascular mortality in asymptomatic hemodialysis patients with preserved left ventricular ejection fraction

	GLS <-15% and cTnT ≤0.03ng/ml (n=44)	GLS ≥-15% or cTnT >0.03ng/ml (n=32)	GLS ≥-15% and cTnT >0.03ng/ml (n=12)	*p* for trend
All-cause mortality, n(%)	7(16%)	9(28%)	8(67%)	0.001
Adjusted HR (95% CI)	Reference	2.9 (0.9-9.3)	7.8 (2.3-26.7)	
p value		0.08	0.001	
Cardiovascular death, n(%)	3(7%)	2(6%)	4(33%)	0.003
Adjusted HR (95% CI)	Reference	0.9 (0.1-5.1)	6.1 (1.3-27.5)	
p value		0.86	0.01	