中文題目:左心房形變在高血壓患者預後預測的應用

英文題目: Prognostic value of left atrial deformation in hypertension

作者: 楊荔丹[1,2] 蔡惟全[1] 李文煌[1] 劉嚴文[1] 林志展[1] 李政翰[1] 李威廷[1]

服務單位: 成大醫院內科[1] 衛生福利部台南醫院內科[2]

Background:

Hypertension, a rampantly growing public health burden, is the most important preventable and leading risk factor for atherosclerosis-related mortality and morbidity including myocardial infarction, stroke, and renal failure. Despite the progress of antihypertensive therapy and robustness of healthcare systems in the present day, the residual cerebral and cardiovascular risk in treated patients remains a serious problem. Regarding hypertensive cardiac remodeling, most scientific work emphasis on the left ventricle (LV) in terms of LV hypertrophy, abnormal geometry, and diastolic dysfunction. On the other hand, the left atrium (LA) also plays an active and essential role early in the course of hypertensive cardiac remodeling. In mild hypertensive patients, LA enlargement has already been observed, translating into an increase in cardiovascular risk, atrial fibrillation, stroke, sudden cardiac death and all-cause mortality. Since the introduction of 2-dimensional (2D) speckle-tracking echocardiography (STE), which helps to uncover the sophisticated LA deformation pattern consisting of reservoir, conduit, and contractile phases, increasing attention has been brought to the functional analysis of LA. In our previous study, a decline in LA phasic function assessed by STE was demonstrated in hypertensive patients. However, less is known about the prognostic significance of a reduced LA deformation in hypertension and the extent to which it provides clinically meaningful risk information beyond LV structure and function. Consequently, in this study we utilized the 2D STE and performed a prospective study to investigate the incremental prognostic value of LA function in treated hypertensive patients.

Methods: Ninety-five regularly treated hypertensive patients (65.2±11.7 years, 60% male) were enrolled in this prospective study. LA deformation indexes including peak LA strain during atrial filling (LASp), peak strain rate in reservoir phase (LASRr), conduit phase (LASRc), and contractile phase (LASRa) were identified using the two-dimensional STE. End-points for this study were any admission for stroke, acute coronary syndrome, heart failure, and death.

Results: After a mean follow-up period of 60.3 ± 18.4 months, 10 (11%) patients reached end-points. The differences between patients with and without end-points included the following: age (75.8 ± 10.2 vs. 64.0 ± 11.2; p = 0.002), diastolic blood pressure (76.0±13.1 vs. 82.1±9.5 mmHg; p = 0.07), use of diuretics (60 vs. 92%; p = 0.003), LASp (18.0 ± 9.92 vs. 28.2 ± 9.55%; p = 0.002), LASRr (1.77 ± 0.66 vs. 2.35

± 0.55 1/s; p = 0.003), LASRc (-1.26 ± 0.85 vs. -1.69 ± 0.55 1/s; p = 0.034), and LASRa (-2.32 ± 0.76 vs. -3.01 ± 0.75 1/s; p = 0.033). Multivariate Cox regression analysis showed LASp (OR 0.894, 95%CI 0.820-0.974, p = 0.01) and LASRr (OR 0.249, 95%CI 0.072-0.861, p = 0.028) were independent predictors for prognosis. By dividing subjects into 2 strata with the cutoff value of 18.9% for LASp and 1.91 1/s for LASRr, the Kaplan-Meier survival curve revealed significant differences (p < 0.001 & p = 0.007 respectively) for endpoints.

Conclusions: In regularly treated hypertensive patients, LA dysfunction was associated with worse outcomes. The present study extends knowledge and adds additional value to clinical application and practice. First, the role of the LA in hypertensive cardiac remodeling was underscored. LA deformation analysis may serve as a noninvasive, useful and cost-effective tool to detect LA ultra-structural alteration and fibrosis to facilitate risk stratification. Second, it may be utilized as a surrogate marker to guide treatment effectiveness in order to reduce adverse cardiovascular events. Furthermore, in patients with poorer LA function, aggressive and tailor-made management may be required. Future explorations in medicines that halt the deterioration in LA deformation may be of potential value. To the best of our knowledge, our findings are the first to correlate impaired LA deformation to detrimental outcomes in patents with regularly treated hypertension. Further verification of this method is in need before it can be more popularly applied.

Table 3. Cox regression analysis for independent factors for outcome

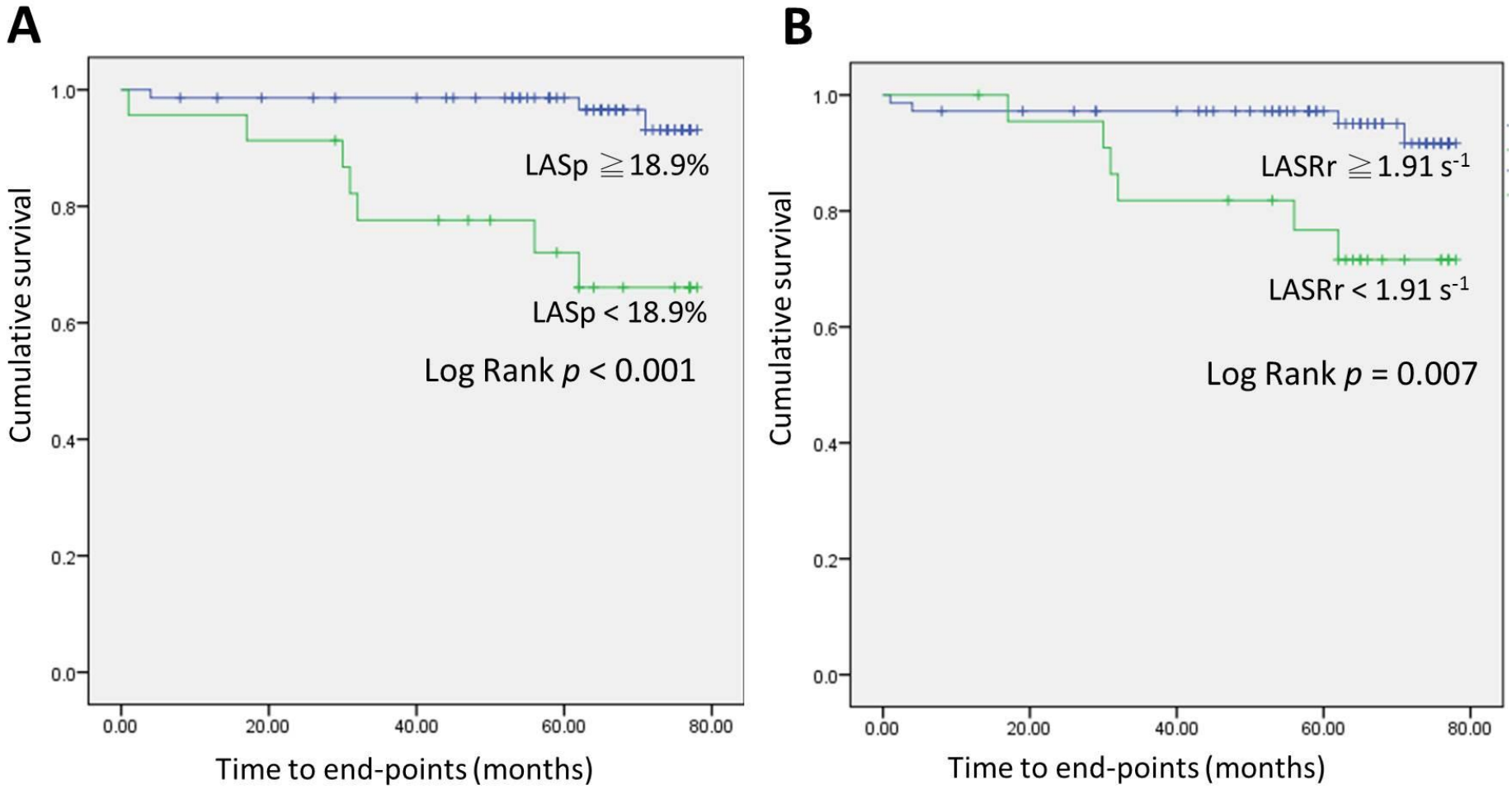
	Univariate Cox		Multi-variate Cox regression analysis									
			Model 1		Model 2		Model 3		Model 4		Model 5	
Any end point	OR (95% CI)	*P* value	OR (95% CI)	*p* value	OR (95% CI)	*p* value	OR (95% CI)	*p* value	OR (95% CI)	*p* value	OR (95% CI)	*p* value
Age	1.119 (1.037-1.206)	0.004	1.093 (0.973-1.227)	0.133	1.119 (0.955-1.310)	0.165	1.098 (0.993-1.214)	0.069	1.089 (0.987-1.202)	0.09	1.190 (0.979-1.447)	0.081
Diuretics	5.076 (1.426-18.068)	0.012	1.662 (0.328-8.410)	0.539	2.079 (0.209-20.625)	0.532	1.277 (0.228-7.164)	0.781	2.099 (0.460-9.577)	0.338	0.874 (0.088-8.628)	0.908
DBP	0.948 (0.893-1.007)	0.082	0.989 (0.927-1.056)	0.745	0.946 (0.860-1.040)	0.251	1.004 (0.931-1.083)	0.913	0.987 (0.922-1.057)	0.710	0.996 (0.904-1.096)	0.931
LASp	0.882 (0.815- 0.955)	0.002	0.894 (0.820-0.974)	0.010	-	-	-	-	-	-	-	-
LASn	1.180 (1.000-1.392)	0.050	-	-	1.182 (0.939-1.486)	0.154	-	-	-	-	-	-
LASRr	0.160 (0.047-0.545)	0.003	-	-	-	-	0.249 (0.072-0.861)	0.028	-	-	-	-

LASRc	5.508 (1.212-25.045)	0.027	-	-	-	-	-	-	6.779 (0.965-47.645)	0.054	-	-
LASRa	2.767 (1.012-7.567)	0.047	-	-	-	-	-	-	-	-	2.054 (0.716-5.887)	0.181

DBP = diastolic blood pressure; LASp = peak positive strain of left atrium; LASn = peak negative left atrial longitudinal strain; LASRr = strain rate in left atrial filling phase; LASRc = strain rate in left atrial conduit phase; LASRa = strain rate in left atrial contraction phase

Models 1, 2, 3, 4, and 5: adjusted for age, status of diuretics use, and DBP.

–: not enrolled.


A
Cumulative survival
1.0
0.8
0.6
0.4
0.2
0.0
LASp ≧18.9%
LASp < 18.9%
Log Rank p < 0.001
0.00
20.00
40.00
60.00
80.00
Time to end-points (months)
B
Cumulative survival
1.0
0.8
0.6
0.4
0.2
0.0
LASRr ≧1.91 s-1
LASRr < 1.91 s-1
Log Rank p = 0.007
0.00
20.00
40.00
60.00
80.00
Time to end-points (months)