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COMMENT

Striving toward effective management of target organ damage

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Target organ damage (TOD) refers to damage or dysfunction that occurs in a specific organ due to prolonged exposure to risk factors. Hypertension is one of the leading causes of TOD such as damage to the heart, brain, kidneys, and arteries (Fig. 1) [1–3]. Assessment of TOD is useful as it exists before the appearance of cardiovascular events [4]. Detection of TOD at the early subclinical stage is important to slow or halt the progression of cardiovascular disease. Brachial-ankle pulse wave velocity (baPWV) is a non-invasive method to measure the degree of vascular damage and is used to assess the effectiveness of interventions (e.g., diet, exercise, and medications) [5]. It is well known that treatment of hypertension improves baPWV. However, in some cases, baPWV remained high despite control of blood pressure to a target levels [6]. When baPWV remains high, it may indicate that the current treatment approach is not adequate. Additional approaches may be necessary to improve vascular damage. Hence, the clinical significance of high baPWV with adequate control of hypertension remains unclear.

In this issue of Hypertension Research, Sunagawa and colleagues reported the results of evaluation of the impact of hypertension and the relationship of increased baPWV to TOD (as evident by the presence of proteinuria and left ventricular hypertrophy) in 13,186 subjects [7]. Proteinuria and left ventricular hypertrophy were evaluated by using the urine dipstick test and electrocardiography, respectively. Their cross-sectional analysis showed that both hypertension and high baPWV (defined as baPWV ≥14.0 m/s) are independently associated with proteinuria and left ventricular hypertrophy. Among the patients treated with antihypertensive drugs, there were 1307 hypertensive patients (94%) with high baPWV and 88 hypertensive patients (6%) with low baPWV. The odds ratios (ORs) with confidence intervals (CIs) of the prevalences of proteinuria and left ventricular hypertrophy were higher in subjects with hypertension (OR, 2.12; 95% CI, 1.74–2.59, OR, 2.55; 95% CI, 2.25–2.90, respectively) than in subjects with increased baPWV (OR, 1.29; 95% CI, 1.01–1.65, OR, 1.66; 95% CI, 1.44–1.92, respectively), suggesting that inadequate blood pressure control may be a more important risk factor than high baPWV for TOD. In addition, the authors investigated the associations between the presence and absence of hypertension combined with the results of baPWV (high baPWV and low baPWV) and TOD. Multivariate logistic regression analysis revealed that the ORs of the prevalences of proteinuria and left ventricular hypertrophy were significantly higher in the group with hypertension and low baPWV (OR, 2.66; 95% CI, 1.78–3.97, OR, 3.04; 95% CI, 2.36–3.93, respectively) and the group without hypertension and high baPWV (OR, 1.41; 95% CI, 1.07–1.86, OR, 1.76; 95% CI, 1.50–2.08, respectively), using the group without hypertension and low baPWV as the reference. These relationships showed the same trends in subgroup analysis of subjects without the use of anti-hypertensive agents. The results of this study suggested that control of hypertension to target levels, even in patients with high baPWV, is effective for preventing TOD.

Although Sunagawa et al. suggested form the results of this large cross-sectional study that adequate control of high blood pressure appears to be more important

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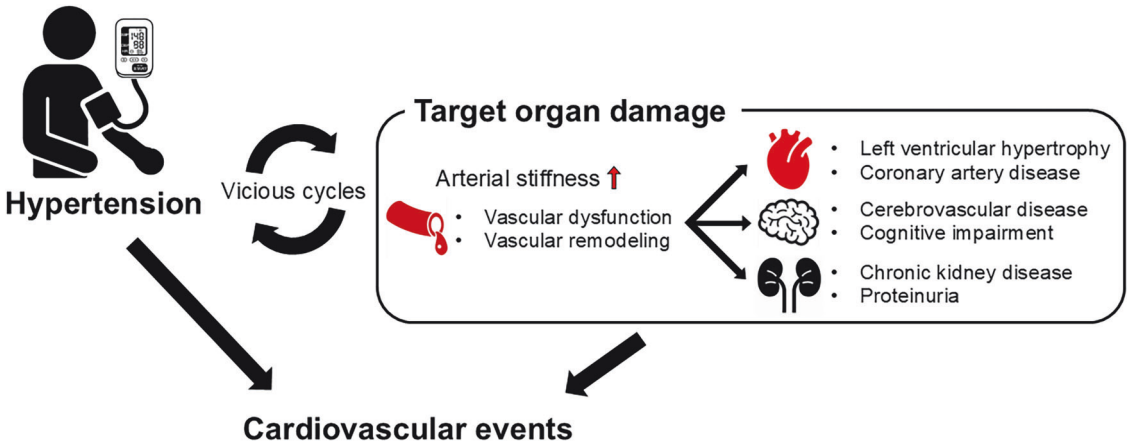

Fig. 1 Vicious cycles of hypertension and target organ damage

than normalization of arterial stiffness for preventing proteinuria and left ventricular hypertrophy, the temporal effects of hypertension and baPWV on TOD and the differences in long-term effects of interventions for hypertension and baPWV on TOD remain unknown. In addition, it is necessary to investigate management strategies such as a method for monitoring TOD, optimal timing of interventions for TOD, and a method for evaluation of intervention effects on TOD to prevent cardiovascular events in hypertensive patients. There are a few reports on these unresolved issues regarding the management and treatment of TOD. The SPARTE trial (number of enrolled patients = 536) was designed to investigate whether a therapeutic strategy targeting the normalization of carotid-femoral cfPWV measured every 6 months is superior to guideline-concordant treatment for primary hypertension in improving outcomes [composite primary outcome: stroke, coronary events (myocardial infarction, angioplasty, bypass), peripheral artery disease (angioplasty, bypass, amputation), hospitalization for heart failure, aortic dissection, chronic kidney disease (doubling of creatinine, dialysis), and sudden death] [8]. The SPARTE trial demonstrated that normalization of cfPWV was associated with better blood pressure control and reduction in the rate of increase in cfPWV compared with guideline-concordant treatment. However, there was no beneficial impact on the incidence of the composite primary outcome due to the insufficient sample size (hazard ratio, 0.74; 95% CI, 0.40–1.38). Research on the management and treatment of TOD in hypertensive patients is limited. Further studies are needed to address these unresolved issues.

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Compliance with ethical standards

Conflict of interest The authors declare no competing interests.

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