Influence of left ventricular systolic dysfunction on occurrence of pulsus tardus in patients with aortic stenosis

Ishizaka S.[1]; Iwano H.[1]; Kamiya K.[1]; Nagai T.[1]; Motoi K.[1]; Chiba Y.[1]; Tsujinaga S.[1]; Kaga S.[2]; Anzai T.[1]

[1]Hokkaido University, Department of Cardiovascular Medicine, Faculty of Medicine and Graduate School of Medicine, Sapporo, Japan
[2]Hokkaido University, Faculty of Health Sciences, Sapporo, Japan

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Background: The time between left ventricular (LV) and aortic systolic pressure peaks (TLV-Ao) which could reflect pulsus tardus (PT) is reported to be a marker of severity and be associated with poor prognosis in patients with aortic stenosis (AS). Despite its worldwide recognition, physiological mechanism of PT has not been well elucidated. We hypothesized that not only severity of the AS but also LV systolic dysfunction could be associated with occurrence of PT.

Methods: TLV-Ao and mean trans-aortic valvular pressure gradient (mean PG) were measured by simultaneous pressure tracing of left ventricle and basal aorta in 74 AS patients with at least moderate severity (78 ± 8 years old). Effective orifice area index (EOAI) was estimated by using continuity equation from transthoracic echocardiography and severe AS was defined as EOAI ± 0.60 cm²/m². Global longitudinal strain (GLS) was measured by using speckle-tracking method and expressed as an absolute value.

Results: TLV-Ao, mean PG, and EOAI was 87 ± 30 msec, 51 ± 21 mmHg, and 0.51 ± 0.14 cm² respectively. A weak correlation was observed between EOAI and TLV-Ao (Figure). In 9 out of 17 moderate AS patients (A in Figure), TLV-Ao was prolonged over the previously reported cut-off value (≥66 msec), on the other hand, it was not prolonged in 11 out of 57 severe AS patients (D in Figure). When the patients were divided by TLV-Ao of 66 msec, mean PG was not different between patients with prolonged TLV-Ao and those without in moderate AS patients (Figure, A vs B; NS), whereas GLS was significantly reduced in prolonged TLV-Ao group (P = 0.0383). In patients with severe AS, mean PG was significantly higher (P < 0.0001) in patients with prolonged TLV-Ao than in those without (Figure, C vs D), whereas GLS was comparable between the groups. In overall patients, multivariable analysis revealed that not only mean PG (β=0.54) but also GLS (β=-0.23) was an independent determinant of TLV-Ao.

Conclusion: The occurrence of pulsus tardus could be associated not only with severity of the AS but also with LV systolic dysfunction in patients with AS.

Abstract Figure