Left atrial strain in cardiac amyloidosis

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Background: Patients with cardiac amyloidosis (CA) display an enlarged and dysfunctional left atrium (LA), because of the effects of left ventricular (LV) diastolic and then systolic dysfunction, as well as the amyloid infiltration of LA wall. A single study reported impaired LA strain in CA, but differences among amyloid light-chain (AL) and transthyretin (ATTR) CA and the correlates of reduced LA strain have not been characterized.

Methods: We evaluated 426 consecutive patients undergoing a screening for suspected CA in 2 tertiary referral centres. Among them, 262 (61%) were diagnosed with CA (n=117 AL-CA, n=145 ATTR-CA). We measured peak atrial longitudinal strain (PALS) and peak atrial contraction strain (PACS) from 4- and 2-chamber (4C, 2C) views, and correlated them with maximum and minimum LA volumes, E/e' ratio, and LV global longitudinal strain (GLS).

Results: LA strain was much more severely impaired in patients with ATTR-CA than those without CA, and to a lesser extent than those with AL-CA (Figure). LA volumes were larger in patients with ATTR-CA than those without CA (maximal LA volume, p=0.042; minimal LA volume, p<0.001), and those with AL-CA (both volumes, p<0.001). LA strain values were more closely correlated with minimal than maximal LA volumes, and patients with AL-CA displayed stronger correlations than those with ATTR-CA or without CA; for example, Spearman's rho values for 4C-PALS vs. minimal LA volume were 0.595, 0.481, and 0.462, respectively (all p<0.001). Furthermore, LA strain correlated with E/e' in patients with AL-CA, but not in those with ATTR-CA: 4C-PALS vs. E/e', rho 0.406, p=0.001 (AL-CA), p=0.401 (ATTR-CA), and p=0.097 (no CA). Finally, LA strain correlated most closely with LV GLS in patients with AL-CA: 4C-PALS vs. LV GLS, rho 0.431, p<0.001 (AL-CA), rho 0.401, p<0.001 (ATTR-CA), rho 0.219, p=0.042 (no CA).

Conclusions: LA volume increase and reduced LA strain is particularly prominent in patients with ATTR-CA. Patients with AL-CA seem to display closer relationships between LA strain, size and haemodynamic load, possibly reflecting the most acute disease course, and lower time for amyloid deposition in the LA wall.