Strain and strain rate evaluation of atrial phasic function in normal aging

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Background

- The left atrium (LA) has multiple functions (reservoir, passive and active emptying).
- LA size has been used as a biomarker for cardiovascular events, whilst there is limited data regarding the prognostic value of LA function.
- Atrial strain has been used to quantitate atrial phasic function in various disease states, including hypertension, hypertrophic cardiomyopathy and diastolic heart failure.

Objectives

- The aim of this study was to examine normal age related changes in atrial phasic function, as measured by tissue Doppler derived atrial strain and strain rate.

Methods

- Transthoracic echocardiograms were performed on 188 normal subjects (20 to 80 years); grouped by decade
- Subjects were excluded if they had ischaemic heart disease, valvular disease, peripheral vascular or cerebrovascular disease, hypertension, or diabetes and were on any cardioactive medications.
- Tissue Doppler derived strain and strain rate were measured from the apical 4 and 2 chamber views of the left atrium (LA), and global values calculated as the mean of four segments (septal, lateral, inferior and anterior).
- Measurements included:
  - Reservoir: systolic strain rate (Ssr)
  - Passive emptying: early diastolic strain rate (Esr)
  - Active emptying: late diastolic strain rate (Asr).
  - Phasic LA volumes and fractions were calculated.

Results

- Ssr correlated with Expansion index (R=0.3, p<0.001).
- Systolic SI decreased from decade 5 (β coefficient=-0.5); Expansion index from decade 7 (β coefficient=-0.2).

Conclusions

- Aging significantly alters the atrium, as a result of diastolic changes, which can be detected by atrial strain rate.
- These changes in atrial strain parameters correlate with traditional parameters of phasic function.
- Systolic and early diastolic strain rate changes occurred a decade prior to phasic volumes.
- Strain rate may be more sensitive in detecting subclinical atrial dysfunction than traditional parameters.

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