

ORAL PRESENTATION

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# Reduced global longitudinal and radial strain with normal left ventricular ejection fraction late after effective repair of aortic coarctation - a CMR feature tracking study

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## Background

Little is known about the state of left ventricular (LV) mechanics long-term after repair of coarctation of the aorta (COA). We sought to determine whether LV myocardial deformation indices measured by cardiac magnetic resonance-based feature tracking (CMR-FT) were abnormal in repaired COA with normal LV ejection fraction (EF), relative to healthy adult controls, and whether such alteration was related to LV hypertrophy.

## Methods

We retrospectively identified 81 patients after COA repair (31 female male; age  $25 \pm 8.5$  years) with inclusion criteria at follow-up CMR of: age  $\geq 13$  years, time post-repair  $\geq 10$  years, no aortic valve disease, LV-EF  $> 50\%$ . CMR-FT was performed in four-chamber and short-axis steady-state free-precession cine sequences to derive global and segmental LV deformation indices and indexed (body surface area, BSA) end-diastolic/end-systolic volumes, mass, and LV-EF. LV deformation and volumetric indices were compared firstly between COA patients and normal controls ( $n=20$ , 10 female, age  $37 \pm 7$  years), and secondly between COA patients with (mass  $> 97$ th percentile for gender and BSA) versus without LV hypertrophy.

## Results

In COA patients versus healthy controls, LV-EF was  $62 \pm 7.2\%$  (mean  $\pm$  SD) versus  $58 \pm 3.0\%$  ( $p=0.01$ ), and LV mass  $66 \pm 16.8$  g/m<sup>2</sup> versus  $57.7 \pm 6.0$  g/m<sup>2</sup> ( $p=0.0001$ ). The LV global longitudinal strain (GLS) was decreased to  $-17.0 \pm 4.7\%$  in COA versus  $-20 \pm 5\%$  in controls ( $p=0.02$ ) and the global radial strain (GRS) was reduced to  $40 \pm 15\%$  versus  $50 \pm 12.4\%$  in controls ( $p=0.003$ ). In contrast, the global circumferential strain (GCS) was preserved in COA patients at  $-23 \pm 4.7\%$  versus  $-24.6 \pm 2.4\%$  in controls ( $p=0.14$ ). Regionally, decrease in LS was particularly marked in the basal segments (septal,  $p=0.005$  and lateral,  $p=0.013$ ). In COA with LV hypertrophy ( $n=45$ , LV mass  $76.3 \pm 12.8$ ) versus COA without LV hypertrophy ( $n=36$ , LV mass  $52.2 \pm 10$ ), GLS was more markedly decreased to  $-15.7 \pm 4.8\%$  versus  $-18.5 \pm 4.2\%$ ,  $p=0.016$ ). In contrast, both GRS and GCS were similar between both COA subgroups ( $p=0.49$  and  $0.27$ ).

## Conclusions

In patients late after COA repair with normal LV-EF, GLS and GRS are reduced whilst GCS is preserved, compared with controls. GLS is even more reduced in the presence of LV hypertrophy. Longitudinal strain is particularly reduced in basal LV segments. GLS may qualify as indicator of early LV dysfunction if confirmed in prospective outcome studies.

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