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Longitudinal Results of Cardiac MRI Left Ventricular Mapping Following Tangential Left Breast Radiotherapy

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Background: Acute and subacute changes of inflammation, reduced capillary density and early myocardial fibrosis have been reported following radiotherapy (RT). We sought to detect these changes by serial cardiac MRI using mapping techniques.

Methods: Using a clinically modified Look Locker Inversion Recovery (MOLLI) sequence at 3T, T1, T2 and ECV maps were generated prior to RT, at 6 weeks and 12 months following completion of breast radiotherapy in left sided breast cancer patients. No patients received chemotherapy. Map values were generated in cvi42.

Results: Average mean heart dose was 2.6 Gy. Average mean dose to basal, mid and apical regions was 1.7 Gy, 3.9 Gy, and 16.3 Gy. Regionally, a significant increase in T2 relaxation was seen in the mid region at 12 months post RT (43.5 vs 42.1 ms p = 0.02). Segmentally, 6 weeks post RT, segment 12 (43.5 vs 42.1 ms p = 0.02) displayed a significant reduction in T2 relaxation, and segments 5 (28.3 vs 27.2% p = 0.2), 9 (29.1 vs 27.6% p = 0.01) and 10 (28.7 vs 27.1% p = 0.01) had significant reductions in T2 values. At 12 months, segment 11 demonstrated an increase in T1(1192.4 vs 1218.0 ms p = 0.02) and T2 values (41.7 vs 44.1 ms p < 0.01), and segment 10 (42.0 vs 43.5 ms p = 0.03) demonstrated an increase in T2 values.

Conclusion: Preliminary results from this small study demonstrated an increase in T2 signal in the mid region 6 weeks post RT, and discrete changes involving the basal inter-atrial, mid inferoseptal, inferior and inferolateral segments. Further studies are required to verify this pattern of change and their relationship to future cardiac events.

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Low-Flow, Low-Gradient Aortic Stenosis: An Increasing Phenomenon or Simply Wider Recognition?

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Background: Aortic stenosis (AS) is the most common primary heart valve disease in the elderly. Low-flow, low-gradient (LF-LG) AS is an increasingly important phenotype but it is unclear whether this represents wider recognition of an existing phenotype or a new disease of increasing incidence.

Methods: We analysed 37,240 consecutive transthoracic echocardiograms (Jan 2013–March 2019 at a single institution. LF-LG AS was defined as mean transvalvular pressure gradient (MPG) <40 mmHg and stroke volume index (SVI) <35 mL/m², aortic valve area (AVA) <1 cm² or indexed AVA <0.6 cm²/m², with either normal (paradoxical LF-LG) or decreased (<40%; classical LF-LG) left ventricular ejection fraction. The proportion of LF-LG pts with E/e’ >12 were sought each year.

Results: Of 1160 cases that fulfilled AS criteria, there were 445 cases of LF-LG AS (118 classical and 327 paradoxical LF-LG AS), and the incidence appears to be rising per year. There was a statistically significant difference in incidence of paradoxical LF-LG AS between each year (p < 0.0001), but not for classical LF-LG AS (p > 0.05). The proportion of cases with severe AS appears to be declining in recent years (p = 0.026).

Conclusion: This is the first study to describe the increasing incidence of paradoxical LF-LG AS in an hospital echocardiogram service. It appears to parallel increasing LV filling pressure in AS patients. There is a need to better understand the driving force of this trend and potential corresponding effective treatments.

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