DEUTSCHES HERZZENTRUM BERLIN

STIFTUNG DES BÜRGERLICHEN RECHTS

Novel cardiac MRI imaging and histological analysis

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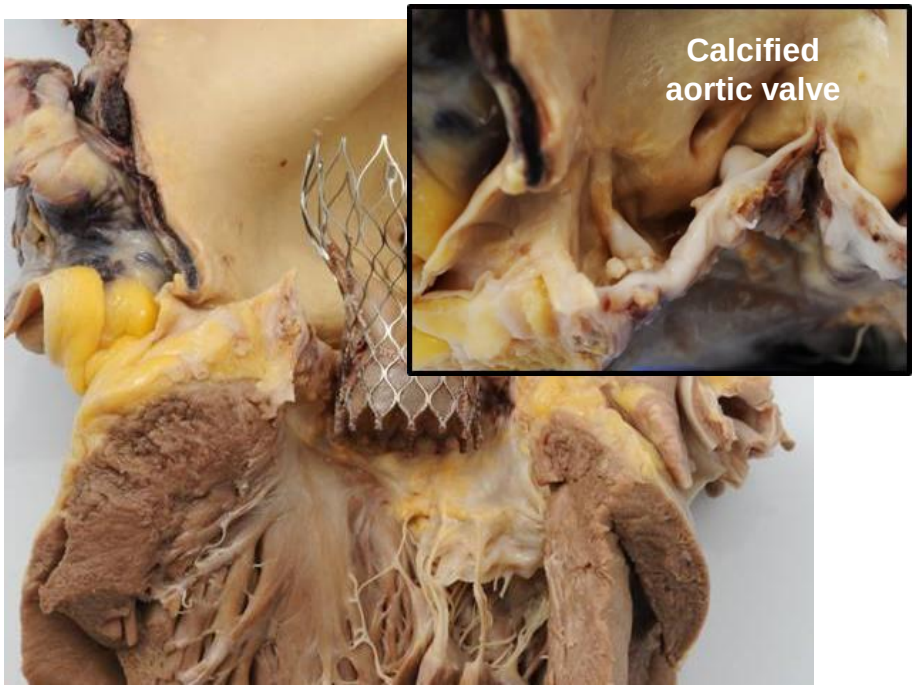
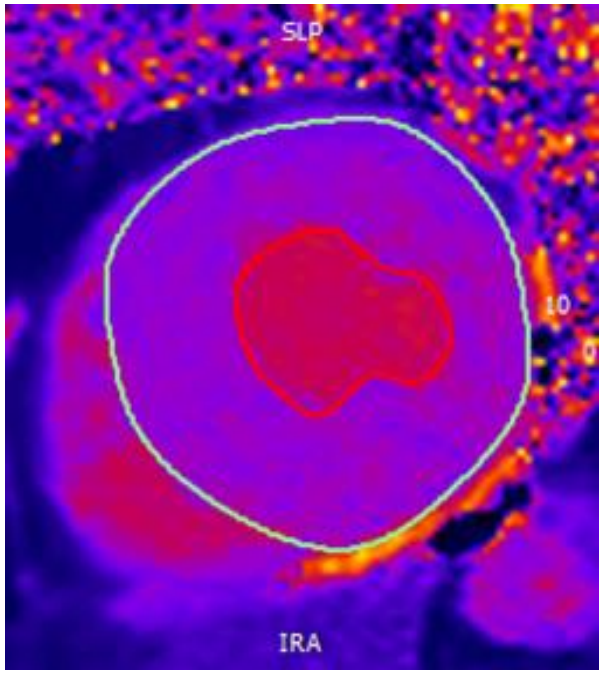
Disclosures

I have no financial relationships to disclose concerning the content of this presentation.

Objective

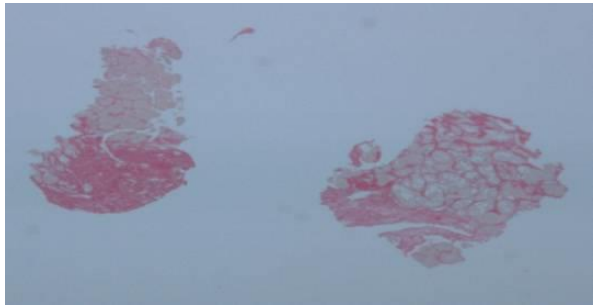




Novel parametric cardiac MRI imaging with T1 mapping (right figure) is gaining increasing popularity due to its ability to identify overall and diffuse fibrosis (interstitial and perivascular versus reactive interstitial fibrosis alone), which is associated with prognosis in cardiac pathology, as in hypertrophic heart disease due to aortic stenosis (left figure).

Methods

Ten patients (8 male, age 73±7 years) underwent gadolinium enhanced MRI before aortic valve surgery on a 1.5T Siemens Avanto, using prototype MRI sequence as previously described.[1] Global extracellular volume fraction was calculated for each patient. Intraoperative Tru-cut transmural left ventricular (LV) myocardial biopsies were taken and fixed in warm buffered formalin. Histological analysis of formalin-fixed paraffin-embedded biopsies was performed on hematoxylin/eosin and Picrosirius red stained 3-micron-thick sections. Images were analyzed with purpose-built software (Nikon NIS elements BR) on a NIKON Eclipse light projection microscope. We determined the extent of overall and reactive interstitial fibrosis, expressed as collagen volume fraction (%) per mm^2.

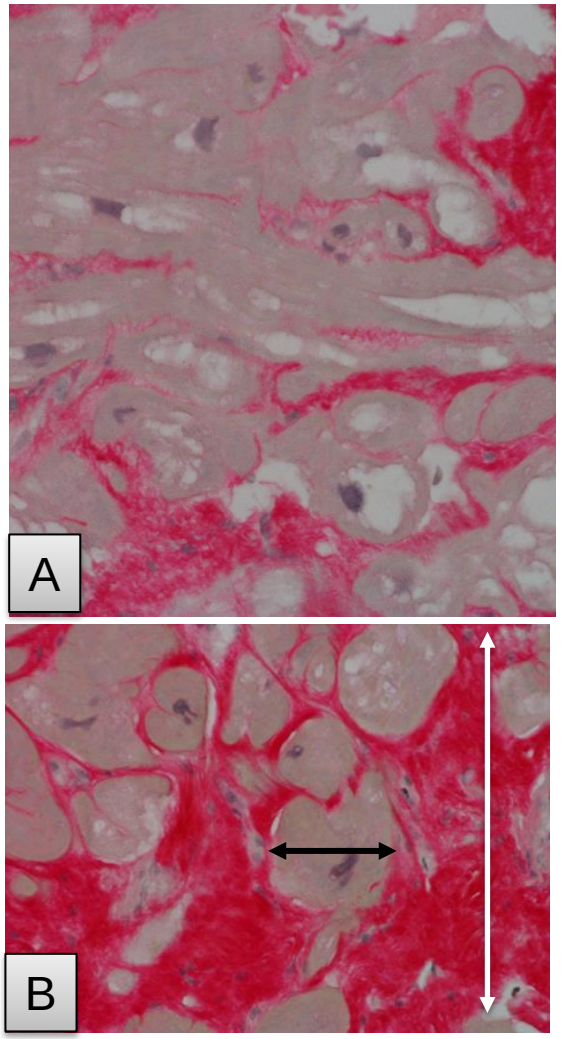


[1]V Vassiliou et al. JCMR 2015; 17 (suppl 1): W26

Results

There was excellent correlation of overall extracellular volume fraction (ECV) as identified by MRI and histologically identified fibrosis correlating with red stained areas on Sirius red stained slides. Scars are defined as double the diameter of a medium sized cardiomyocyte (see figure B, diameter marked with black arrow, scar area marked with white arrow). The following correlation was identified:

Histologically quantified fibrosis fraction = 163*ECV -34, R2=0.83).



Conclusion

Novel imaging and novel methods of histological analysis can be utilized together to confirm accurate non-invasive estimation of myocardial fibrosis in patients with aortic stenosis.

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