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Meeting abstract

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1045 MRI evaluation of biophysical proprieties of ascending aorta in bicuspid aortic valve

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Introduction

Bicuspid aortic valve (BAV) is the more frequent congenital cardiac malformation affecting 1 to 2% of the population and may be complicated by valvular dysfunction and infective endocarditis. In addition BAV is associated with aortic wall abnormalities leading to enlargement of the ascending aorta and risk of aneurysm formation and dissection independently of the valvular function.

Purpose

To detect aortic wall biophysical properties differences between young patients with BAV matched with control subjects by means magnetic resonance flow mapping evaluation.

Methods

We enrolled twenty-five consecutive patients with BAV, without significant aortic valve disease, aged from 9 to 21 years old (mean age 15 ± 5 y.o.), and ten healthy volunteers age and sex matched as control group. All the subjects underwent a cardiac MRI study comprehensive of phase velocity mapping acquisition at several aortic level (proximal ascending aorta, distal ascending aorta, thoracic aorta, and at diaphragmatic level). In order to obtain a high temporal resolution of aortic wall excursion, approximately 10-3 sec, we set the number of cardiac phases according to the heart rate. The systemic pressure (P) was non-invasively measured at each acquisition. Cross-sectional area (A) and aortic wall distensibility (measured as follow: D = (Amax-Amin)/[Amin × (Pmax - Pmin)]) have been evaluated at each location. The relative velocities of maximal systolic distension and diastolic recoil (RVSD and RVDR respectively) were measured in ascending aorta, expressed as the relative change of cross-sectional area in each cardiac phase (percentile of maximal area/10-3 sec). Flow wave velocity propagation (FVP) was measured as the distance between ascending and descending aorta divided by the flow velocity peak delay.

Results

The ascending aortic area was significantly larger in patients compared to control (705 ± 322 vs 455 ± 318 mm2 $p < 0.05$) with a significantly lower distensibility (6 ± 2.8 vs 8.3 ± 3.5 103 mmHg-1 $p < 0.05$). RVSD was sig-

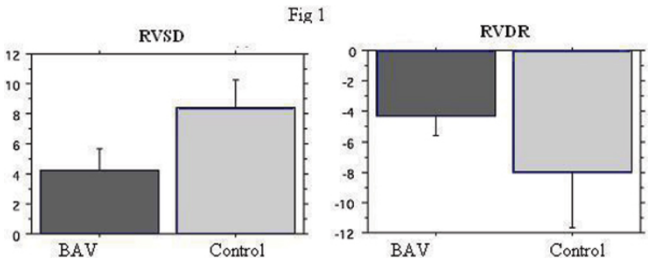

Figure 1
Significant differences in velocity of aortic systolic distension and diastolic recoil between patient with bicuspid aortic valve(BAV) and normal patient could explain the propensity of ascending aorta dilation in BAV patient.

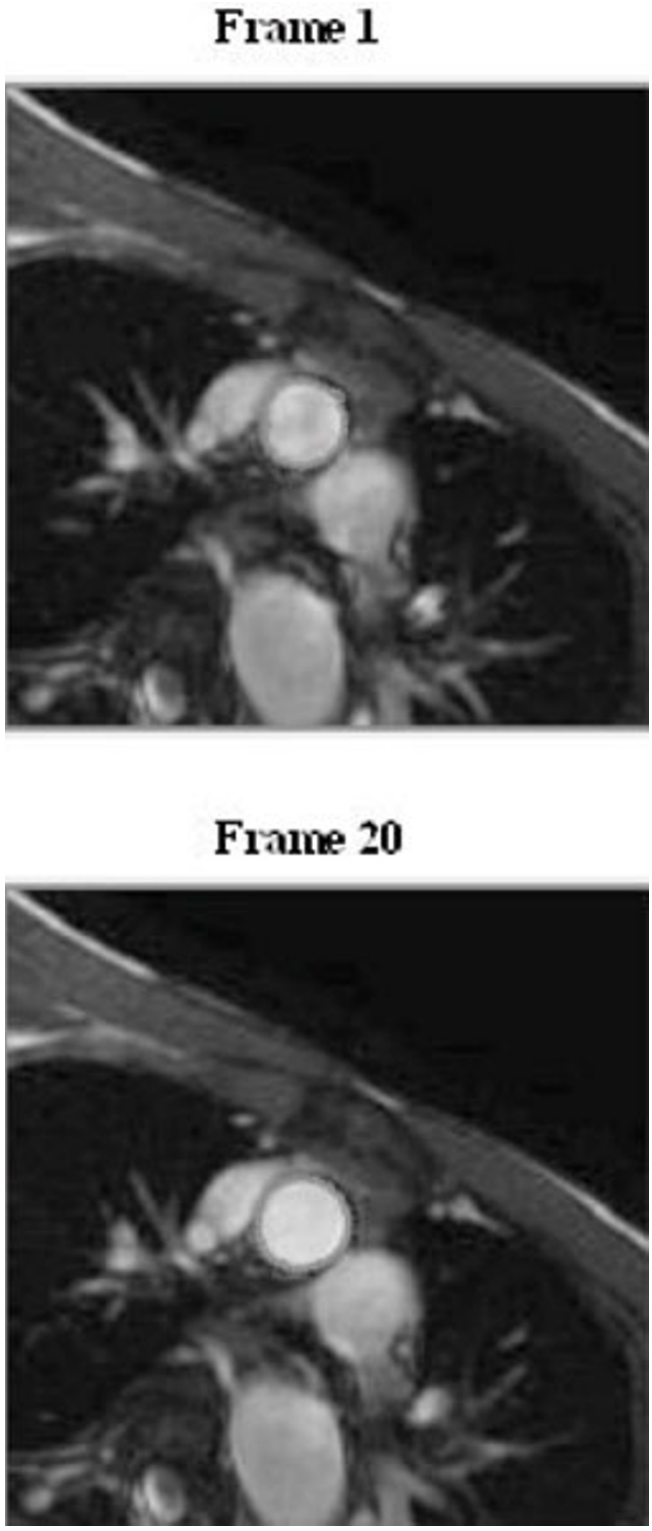

Figure 2

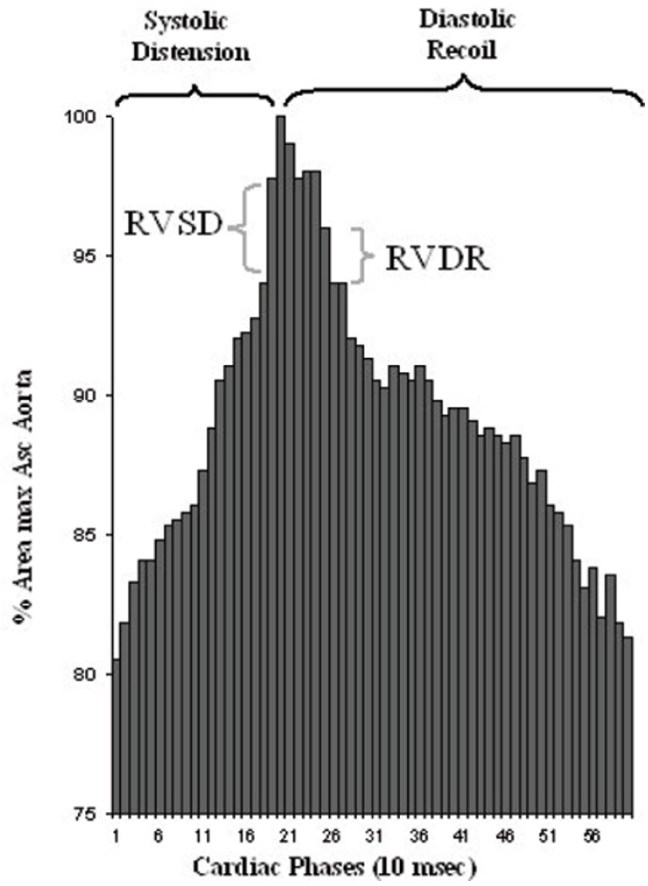

Figure 3

nificantly lower than in control (4.2 ± 1.4 vs 8.45 ± 1.94 %tile of maximal area/10-3 sec $p < 0.0001$) (Fig 1), as well as RVDR (-4.34 ± 1.2 vs -8.04 ± 2.66 %tile of maximal area/10-3 sec $p < 0.0001$) (Fig 1). FVP resulted significantly higher in pts than in control (2 ± 0.8 vs 1.28 ± 0.83. mm/msec. $p < 0.05$).

Conclusion

In young pts with BAV the ascending aorta area is significantly larger than control. Moreover there is a significant lower velocity of both ascending aorta distension and recoil during the systo-diastolic excursion as well as a faster FVP. Such abnormal aortic wall biophysical properties could explain the propensity of ascending aorta dilation in BAV pts. Further longitudinal study could help to early identify BAV pts prone to develop more severe ascending aortic dilatation. Figures 2, 3.