Material and methods: The study group consisted of 33 patients (62±8.7 years, 19M, 14F) with aortic calcifications, but free of CAD on angiograms. A control group consisted of 33 patients (60±5±2.24 years, 19 M, 14F) with normal coronary arteries and no aortic valve calcifications was used for reference. There were no differences between both groups in regard to age (p=0.293), hypertension (p=0.881), diabetes (p=0.348), smoking (p=0.348), gender (p=1.0) and hyperlipidaemia (p=0.881).

Maximal intima-media thickness (IMT) was assessed in all patients at both common carotid artery (CCA) and internal carotid (ICA) arteries and expressed as a mean measured value.

Results: The average IMT was 1.19±0.3 for group with aortic valve calcifications and 1.01±0.17 mm for reference group (p=0.0024). There were no significant differences in IMT measured at both CCA and ICA between groups with the aortic valve calcifications compared to the control group (1.5±0.5 mm versus 1.19±0.24 mm, p=0.0016).

Conclusions: The calcifications of aortic valve might be associated with a greater average IMT measured at carotid arteries, especially with a greater bulb IMT. However, no differences were found in CCA and ICA intima-media thickness between groups with aortic valve calcifications and normal valve.

Clinical data, resting and dobutamine stress echocardiography in aortic stenosis patients with bicuspid or tricuspid valve and the prognostic value of valve morphology.

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Background: Pathomechanisms of bicuspid and tricuspid aortic valve stenoses differ. There is no data in the literature comparing in detail differences between these pathologies in clinical presentation and echocardiographic parameters assessed both at rest and during dobutamine stress test.

Aim of the study: Comparison of clinical data, resting and dobutamine echocardiography (DE) and follow-up data in patients with aortic valve calcifications compared to the control group (1.5±0.5 mm versus 1.19±0.24 mm, p=0.0016).

Methods and Results: The mean number of frames recorded per cardiac cycle was 122±16. The improved spatial and temporal resolution (frame rate 250Hz) enables a detailed imaging of the morphology of the aortic valve and the dynamic changes.

Conclusions: 1. Patients with stenotic aortic bicuspid valve are younger and taller than persons with stenotic tricuspid valve. 2. No differences in echocardiographic parameters at rest and after DE were found between groups. 3. DE is safe in moderate aortic stenosis regardless of valve cusps number. 4. Number of aortic valve cusps did not influence progression of moderate stenosis in one year follow-up.

A new 3D-echocardiographic system using digital radio frequency data - visualization and quantitative analysis of aortic valve dynamics with high spatial and temporal resolution.

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Background: Common 3D-systems have only limited spatial and temporal resolution (frame rate 25Hz). Structures like cardiac valves are not imaged exactly, rapid movement patterns cannot be precisely recorded. The objective of the present project was to achieve radio frequency (RF) data transmission to the 3D-workstation to improve image resolution.

Methods and Results: A commercially available echocardiographic system (5 MHz TEE probe) with an integrated raw data-interface enables transmission of RF data (up to 40 MB/sec). A 3D data set may contain up to 3 GB, so that the entire volume-rendering is available. Frame rates of up to 160 Hz result in temporal resolution six times that of standard 3D systems. The applicability of the system and the image quality were tested in 10 patients. The structure of the aortic valve and the dynamic changes were depicted by volume-rendering. The changes in the orifice areas were measured in frame-by-frame planimetry.

The mean number of frames recorded per cardiac cycle was 122±16. The improved structural resolution enabled a detailed imaging of the morphology of the aortic cusps. The rapid systolic movement patterns were recorded with up to 51 frames. The high number of frames enabled creation of precise area-time diagrams (figure). Thus, the individual phases of aortic valve movement (rapid opening/slow valve closing/rapid valve closing) could be analyzed quantitatively.

Conclusion: A 3D-system based on RF data enables high-resolution imaging of cardiac movement patterns. This offers new perspectives for qualitative and quantitative analyses, especially of cardiac valves.