**Non- contrast- enhanced 3D SSFP versus contrast-enhanced MR angiography for imaging of heart and great arteries in the chest: Initial experience**

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***Background***: Contrast enhanced MR angiography (CEMRA) is increasingly used in clinical routine for evaluation of great arteries in the thorax. Recently, a selective Steady–State Free Precession (SSFP) technique has become available. The technique allows display of arteries and cardiac anatomy without administration of contrast agent (1)

***Aim***: To evaluate the feasibility, reliability and clinical application of non selective free breathing, navigator gated 3D SSFP technique for the anatomical assessment of the heart, coronaries and thoracic great arteries and to compare results with CEMRA.

***Materials and Methods***: Twenty clinical patients (9F, 11M 13-70 yr old, median 35) referred for a routine cardiac MRI for various indications have been studied. A 1.5 T clinical MR scanner (Siemens Avanto) was used for data acquisition. In all 20 patients, initial non selective 3D True FISP imaging of the whole chest (average acquisition time was 10 minutes) was performed, followed by TrueFISP cine of the heart and contrast enhanced MR angiography. Using a 4-point scale scoring system two experienced radiologists evaluated both 3D SSFP and CEMRA for image quality presence of motion artifacts. 20 vascular segments were evaluated per patient including the coronary arteries, pulmonary arteries, aorta, supraaortic vessels. Extra cardiac arterial occlusive disease was assessed using a 0-4 point score grading (none 0, irregularity 1, mild to moderate stenosis10-50%2 significant stenosis > 50-90% 3 and occlusion 4). Coronary artery anatomy as well as additional vascular pathologies was documented. Intravascular signal to noise ratio (SNR) values were determined for both 3D SSFP and CEMRA.

***Results:***

The overall image quality of SSFP was comparable to CEMRA. The overall visibility of heart, coronary arteries and extracardiac great arteries was better on 3D SSFP than CEMRA ($p<0.0001$). 3D SSFP was less prone to motion artifacts compared with CEMRA ($p <0.0001$). The mean intraluminal SNR was better on CEMRA than 3DSSFP without significant statistical difference ($p<0.1$). Stenoses and aneurysm of the great arteries that were reliably detected by both modalities with a good inter observer agreement (Kappa 0.8). The anatomy of the coronary arteries was confidently diagnosed in all subjects by SSFP. In one patient an anomalous origin of the coronary arteries was demonstrated by SSFP. Cardiac morphology including TGA (4 patients), abnormal superior and inferior orientation of ventricles (2), mechanical valve prosthesis (2 patients) were identified by 3D SSFP and CEMRA. Ventricular (2 patients) and atrial (1 patient) septal defects, aortic valve thickening and regurgitation (2 patients), pericardial cyst (1) and mediastinal cystic tumor (1 patient) were demonstrated by 3D SSFP, which were not seen by CEMRA

***Conclusion:***

Non-selective free breathing 3D SSFP appears to be a robust technique for non-contrast-enhanced display of heart including coronary arteries and great arteries. It showed comparable results to CEMRA for the evaluation of the extra cardiac great arteries. It was superior in the assessment of cardiac anatomy and proximal coronary artery evaluation.3D SSFP appears a valuable imaging modality in patients with limited breath-holding capabilities and contraindication to the administration of intravenous contrast agent.

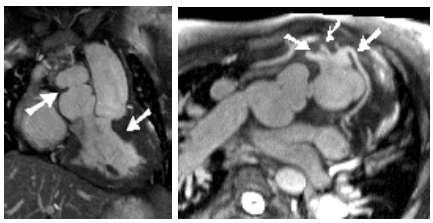

Figure1
3D SSFP images of a patient with double outlet right ventricle demonstrates narrowing of pulmonary trunk due to banding (white arrow).In same patient there is common origin of all coronaries from the anterior cusp (arrows)

***Reference***

***1.*** Sorensen TS, et al., Circulation 2004, 110:163-9.