



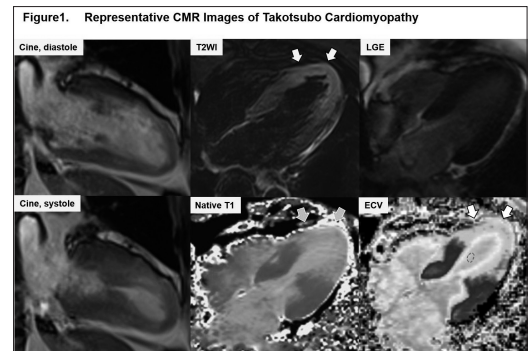
JSCVR Oral Presentation

1 T1 mapping on 3T CMR Detects Myocardial Edema in Patients with Takotsubo cardiomyopathy

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[Purpose] We investigated the diagnostic significance of native T1 and extracellular volume fraction (ECV) compared with a conventional T2-weighted imaging (T2WI) for detecting reversible myocardium in Takotsubo cardiomyopathy (TTC). **[Method]** CMR examination was performed in 22 TTC patients at baseline and after 3 months of onset of TTC included: 1) dark-blood T2W; 2) turbo spin echo T2-mapping; 3) native T1 (faster modified look-locker inversion recovery); 4) ECV, and 5) late gadolinium enhancement. **[Result]** Compared with controls, TTC patients had significantly higher T2 (95.4 ± 46.5 vs. 68.1 ± 12.3 , $p < 0.001$) and native T1 ($1,401 \pm 163$ ms vs. $1,250 \pm 90$ ms, $p < 0.001$), and increased ECV ($34.6 \pm 5.4\%$ vs. $29.3 \pm 3.5\%$, $p < 0.001$) in the involved myocardium. Receiver-operating characteristic analysis for detecting myocardial edema showed that native T1 and ECV had a significantly larger area-under-the-curve compared to TSE T2-mapping (0.86 and 0.88 vs. 0.78, $p < 0.01$). A native T1 cutoff of greater than 1,421ms most optimally differentiated affected segments by edema from normal segments with a sensitivity and specificity of 74 % and 82 %, respectively. At 3 months of follow-up, both elevated native T1 and ECV significantly decreased ($p < 0.001$, $p < 0.001$, respectively) concomitant with LV wall motion recovery. **[Conclusion]** Native T1 and ECV mappings are promising techniques for objectively detecting myocardial edema with a high diagnostic performance and native T1 may be useful indices for repeated quantitative assessment in patients with TTC.

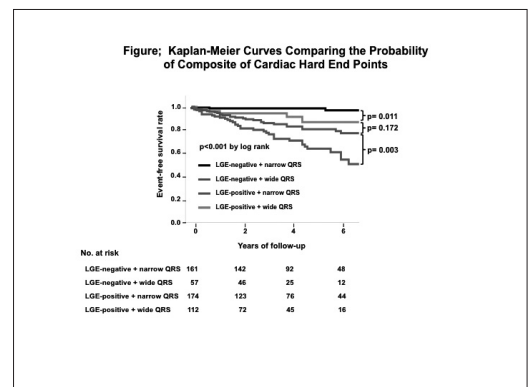


2 Prognostic impact of wide QRS plus gadolinium enhancement dilated cardiomyopathy

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Purpose. Late gadolinium enhancement, LGE, is not necessarily ideal for detecting diffuse myocardial fibrosis. To avoid missing patients at high risk for cardiac events by assessing LGE status alone, we wished to determine whether LGE plus wide QRS is a better prognostic factor in patients with idiopathic dilated cardiomyopathy, DCM. **Method.** LGE and ECG results in consecutive 504 patients with DCM were examined. Patients were divided into four groups, LGE –positive+wide QRS, n=122, or narrow QRS, n=174, and LGE –negative + wide QRS, n=57 or narrow QRS, n=161. The composite end point was cardiac death, cardiac transplantation, LV assist device implantation, ventricular fibrillation, Vf, ventricular tachycardia, VT, or appropriate ICD discharge for Vf and VT. **Result.** During median follow up of 47 months, 76 patients developed the cardiac events . Kaplan – Meier curves analysis showed that the cardiac event free survival rate was lowest in the LGE –positive + wide QRS group and highest in the LGE –negative + narrow QRS group, $P < 0.001$. There was no significant difference in the cardiac event free survival rate between the LGE –positive + narrow QRS and LGE –negative + wide QRS groups, $P = NS$; **Figure.** Multivariable Cox regression analysis identified that the combination of the presence of LGE and wide QRS was an independent predictor for the cardiac events. **Conclusion.** The combination of LGE and wide QRS provides more clinically relevant information for assessing the risk of cardiac events in patients with DCM than LGE status alone.



3 Evaluation of damaged myocardium using gated SPECT and cardiac MRI

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Purpose: We evaluated damaged myocardium using gated SPECT with two different automated software packages and cardiac MRI. Method: Seventy one patients with cardiac disturbance were examined at SPECT and cardiac MRI. Left ventricular ejection fraction, LVEF, defect score and defect area were obtained by analyzing SPECT data with two different automated software packages: Quantitative Gated SPECT, QGS, and Cardio REPO. Delayed enhanced area, and enhanced region were analyzed in cardiac MRI. These examinations were performed within 2 weeks. Result: High correlation were noted in cardiac MRI and both two SPECT data in LVEF; QGS, $r: 0.89$, Cardio REPO, $r: 0.72$. Correlation between defect score in QGS and Cardio REPO were high, $r: 0.85$. Percentage of defects in Cardio REPO and delayed enhanced area in cardiac MRI had moderate correlation, $r: 0.63$. Percentage of defects in Cardio REPO tended to be larger in patients having relatively large delayed enhanced area. Defect score, percentage of defect area and delayed enhanced area were significantly smaller in patients with normal LVEF than in patients with impaired LVEF. Conclusion: Parameters from gated SPECT and cardiac MRI will be able to express detailed characteristic of damaged myocardium. Their quantitative evaluation may provide useful information in clinical fields.

4 Relationship of left ventricular dyssynchrony in the phase analysis on gated myocardial perfusion SPECT and late gadolinium enhancement on MR imaging in patients with hypertrophic cardiomyopathy

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Purpose :Hypertrophic cardiomyopathy is a primary cardiac disorder. Abnormal strain is independently associated with adverse cardiovascular outcomes in patients with HCM. We aimed to investigate the relationship of dyssynchrony in the phase analysis on gated myocardial perfusion single photon emission computed tomography and late gadolinium enhancement on cardiac MR imaging in HCM patients. Methods:We reviewed 24 consecutive HCM patients who underwent both contrast-enhanced CMR- and stress-rest gated MPS imaging 201-Tl using a CZT camera. Left ventricular dyssynchrony was analyzed by using Heart Function View, by which phase SD and histogram bandwidth were calculated. On the CMR imaging, the intensity and the extent of LGE were visually evaluated. ECG parameters including the QT and QRS intervals and plasma brain-type natriuretic peptide BNP were also recorded. Result:phase SD was strongly associated with phase bandwidth, and moderately with ejection fraction, QTc- and QRS interval. The correlations between phase SD and other parameters were 0.99, -0.56, 0.60 and 0.46 for phase bandwidth, EF, QTc-, and QRS interval, respectively. Although no statistically significant difference was found between the dyssynchrony and the LGE intensity, the extent of LGE was significantly associated with the dyssynchrony. Conclusion:In HCM patients, the dyssynchrony parameters by MPS was significantly associated with myocardial damage extent on CMR imaging, even if no hypoperfusion area was detected on MPS images.

5 Correlation among lung PBV, lung perfusion SPECT and pulmonary angiography images in patients with CTEPH.

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Objectives Dual-energy computed tomographic <DECT> pulmonary angiography has recently become an accepted technique for diagnosing pulmonary thromboembolism <PE>. Post-processing software is used to produce an iodine-distribution map <lung perfusion blood volume <PBV>>. We evaluate the correlation among lung PBV, lung perfusion SPECT and pulmonary angiography images in patients with chronic thromboembolic pulmonary hypertension <CTEPH> before and after balloon pulmonary angioplasty <BPA>. **Methods** A total of 17 patients 57 sessions were evaluated with the three modalities. Pre-BPA and post-BPA lung PBV CT, SPECT and pulmonary angiography images based on anatomical segments were compared. **Results** There was generally a high rate of agreement among pulmonary angiography, lung PBV and SPECT, although there was a higher false-negative rate for PBV likely caused by systemic collateral circulation to areas supplied by stenotic PA branches. A total of 41 segments on lung PBV images and 26 segments on lung perfusion SPECT images did not contain lung perfusion defects before BPA. There were 15 discrepant segments which had no defects on PBV images and had defects on SPECT images. Bronchial artery enlargement was observed with a higher probability in lung PBV image with discrepant segments as compared with lung PBV image without discrepant segments <p = 0.03>. **Conclusions** There was generally a high rate of agreement among pulmonary angiography, lung PBV and SPECT images in patients with CTEPH before and after BPA. However, there were a little differences among these modalities. Therefore, the combination of them can provide more accurate assessment of the pathological condition in patients with CTEPH.

6 Comparison of filtered back projection, hybrid- and model-based iterative reconstructions: tradeoff between noise reduction and inartificial visualization

○Kenichiro Hirata, Daisuke Utsunomiya, Hideaki Yuki, Seitaro Oda, Takeshi Nakaura, Yasuyuki Yamashita

Kumamoto University·Diagnostic Radiology

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7 A case of pulmonary hypertension caused by isolated large vessel vasculitis in proximal pulmonary arteries: imaging and intervention

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8 Aortic shape and blood flow pattern in bicuspid aortic valve

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Purpose: Four-dimensional flow-sensitive magnetic resonance imaging, so-called 4D-flow, is a powerful technique to visualize the blood flow pattern in the vessel. We applied this technique to two patients with bicuspid aortic valve and analyzed the flow pattern in the thoracic aorta. **Methods:** The 4D-flow images were obtained in five minutes using 3D kat-ARC technique with following parameters: TR 5.3 msec, TE 2.0 msec, Flip angle 10°, BW 62.5 kHz, Matrices 180x180, FOV 38x26.6 cm, slice thickness 3 mm with overlap of 1.5 mm, NEX 4. **Results:** On 4D flow images, vortex and helical flow was observed in the ascending aorta in both cases. In one case, the blood flow was laminar in the descending aorta with the shape of straight. In another case with winding descending aorta, where the blood flow pattern was helical. The extent of vortex and helical flow might be related to the morphology of the descending aorta. In the previous study, the shape of the aortic arch were divided into three groups, including round, cubic and Gothic, and it was revealed that the bicuspid valves altered ascending aorta hemodynamics. **Conclusion:** In our experience, the blood flow pattern also affect the shape of the descending aorta.



9 Case report: Bronchial and coronary arteries to pulmonary artery shunt in a patient

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Bronchial artery embolization is a well-established treatment for patients with hemoptysis. In this case, a communication between the coronary branch and bronchial artery is suspected on non-ECG-gated CT before bronchial embolization. ECG-gated cardiac CT shows the hypertrophied sinoatrial nodal branch from right coronary artery and bronchial artery emptying into pulmonary artery.