ISC Symposium ll: Cardiovascular Disease Screening

SY26-1

Cardiovascular Specialized Imaging Center in Japan: Challenges and Future Potential

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Cardiovascular imaging clinic (CVIC) is the first and only cardiovascular-specialized imaging center in Japan founded in 2009. Different from other imaging centers, CVIC is using one 320MDCT and two 1.5TMRI mainly for cardiovascular imaging. For 9 years, CVIC has scanned about 44,000 cases of cardiac CT and MRI accounting for about 10% of cardiac MRI in Japan. Based on a lot of clinical experience, CVIC is trying to utilize cardiovascular imaging for screening of cardiovascular disease. Coronary artery calcification measured as Agatston calcium score on non-contrast and ECG-gated CT is a powerful tool for detecting coronary atherosclerosis, especially in the advanced phase. There is discrepancy between coronary artery calcification and flow-limiting coronary artery stenosis. In addition, coronary artery calcification often interferes diagnostic performance of coronary CTA. Coronary MRA can visualize coronary arteries without iodinated contrast agents or radiation exposure. Since calcification has no MRI signal, coronary MRA is less affected by calcification as far as there is enough blood flow to generate strong MRI signals. Combination of non-contrast CT and MRI would be an ideal approach for screening cardiovascular disease. In the seminar, advantages and disadvantages of coronary MRA focusing on patient's selection will be discussed. Our approach of cardiac CT and MRI for screening cardiovascular disease will be introduced. Also, CVIC's challenges and future potential as an independent and unique imaging center will be discussed. It would help to understand how cardiovascular imaging can help for screening cardiovascular disease.
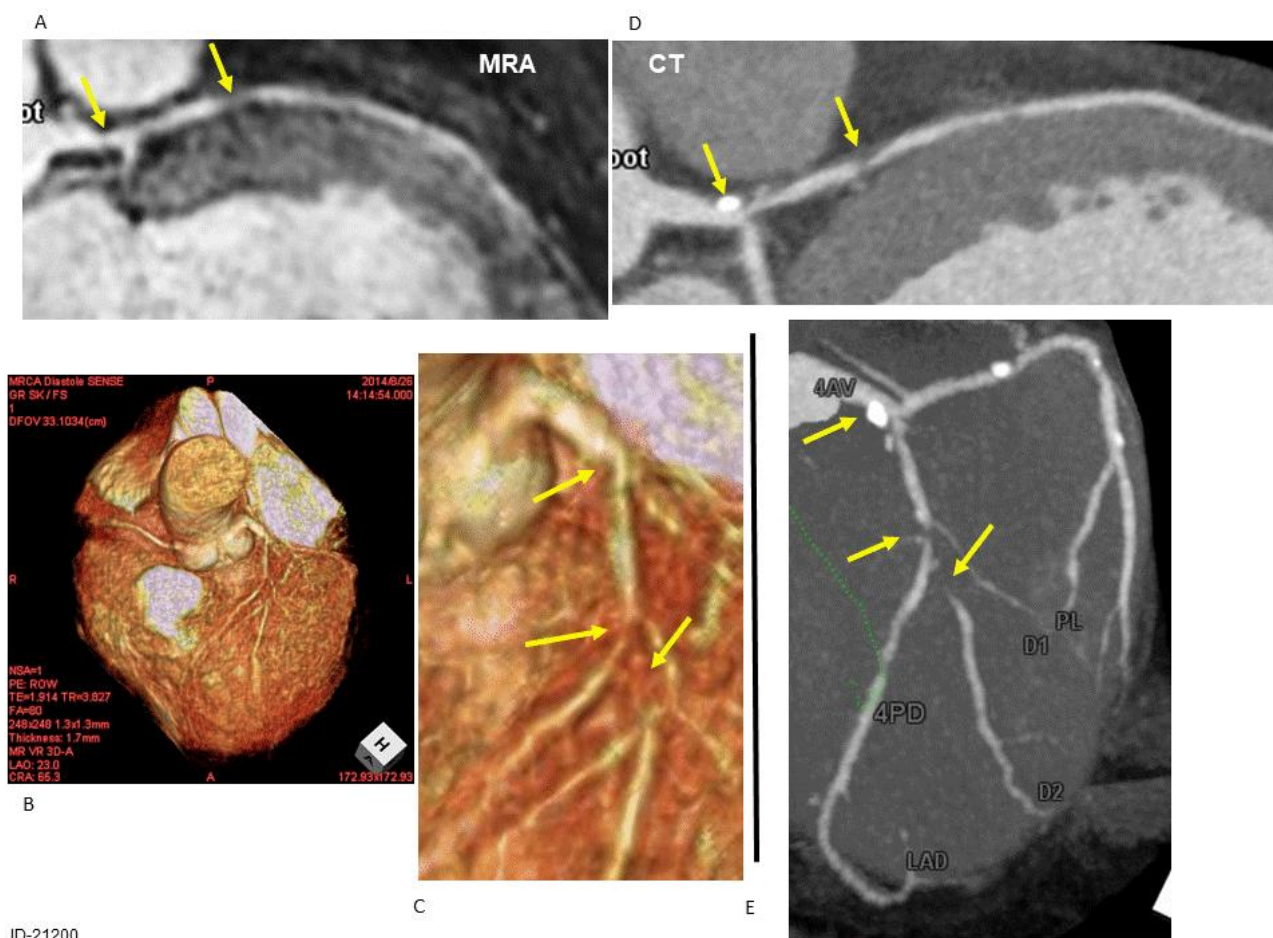
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Fig.1. Representative case of coronary artery stenosis in LAD on coronary CT and MRI. A gentleman of 55 years old with diabetes, hypertension, hyperlipidemia and smoking without chest symptom visited CVIC for cardiac checkup. A-C: Coronary MRA revealed mild stenosis in the distal of left main coronary artery (LMT), significant stenosis in the proximal of left

anterior descending artery (LAD) and the second diagonal branch (D2). D and E: Coronary CTA showed moderate stenosis with calcification in LMT and significant stenosis with non-calcified plaque in LAD and D2. A: Curved planar reformation (CPR) of LAD on coronary MRA B: 3D volume rendering (VR) image of whole-heart coronary MRA C: Zoomed view of B D: Curved planar reformation (CPR) of LAD on coronary CTA F: Maximum intensity projection (MIP) of LAD on coronary MRA

Keywords : Coronary MRA, Coronary CTA, Coronary artery calcification

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Non-Contrast MRA Techniques for Whole Body Cardiovascular Screening

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Cardiovascular disease (CVD) consists of heart and blood vessel disorders that include various arterial and venous diseases. CVD is the leading global cause of death, accounting for about one in every three deaths in in many countries. Atherosclerosis causes stroke and heart attack that dominate the major mortality rate. Because the entire vascular system is linked within a body, multiple atherosclerotic incidents can occur by hidden plaques, e.g. multiple stenoses in different regions like in abdomen/peripheral and carotid/intracranial vessels. Thus, the systemic understanding of the entire vasculature condition is ideal for proper treatment planning and management of CVD, helping to prevent adverse events and thereby improving quality of life of patients. Digital Subtraction angiography (DSA) is a gold standard for CVD, but invasiveness and radiation limit its usage; thus, it is often used only to confirm disease progress. CT angiography (CTA) requires intravenous iodine-based contrast and ionizing radiation, and therefore is not entirely safe for repeated studies. Furthermore, many CVD patients has impaired renal function and thus have a substantial issue with iodine-based contrast agents. Contrast-enhanced MRA (CE-MRA) uses administration of Gadolinium-based contrast agents (GBCA); nevertheless, there are concerns of nephrogenic systemic fibrosis and GBCA retention in various organs. Therefore, there is no safe, whole-body vascular scan method currently available. We propose a combination of non-contrast MR angiography (NC-MRA) techniques, such as 3D time-of-flight (TOF) in intracranial, a spin labeling using a tag-on/off time-spatial labeling inversion pulse (Time-SLIP) in carotid, diastolic-triggered fresh blood imaging (FBI) in thoracic, flow-in Time-SLIP in abdominal, and FBI with ECG-gated subtraction in peripheral MRA. We will discuss the characteristics of each technique for various parts of body.

Keywords : Cardiovascular, Non-contrast MR angiography

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Potential role of CMR screening for asymptomatic subjects with cardiovascular risk factors

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CMR is an imaging tool that can provide comprehensive information on heart disease. However, compared with other imaging tools, it takes a long time to scan and it is relatively expansive. This lecture will provide an opportunity to discuss the availability of each sequences of CMR as screening tool for asymptomatic individuals. And we would like to discuss whether CMR test is worthy of use in asymptomatic subjects.

Keywords : Cardiovascular, Screening, Asymptomatic