A 56-year-old man with symptomatic atrial fibrillation (AF) was referred to our arrhythmia center for pulmonary vein isolation by catheter ablation. The patient underwent routine transesophageal echocardiography (TEE) and cardiac magnetic resonance (MR) examination before the catheter ablation. The cardiac MR examination consisted of time-resolved (4-dimensional) contrast-enhanced MR angiography (TR-MRA), cine imaging with steady-state free precession, and 3-dimensional (3D) late gadolinium enhancement (3D-LGE) sequences. In assessments of cardiac function and thrombus (Figure 1), the TEE image demonstrated the nodular structure adhering to the interatrial septum of right atrium (RA). The cine image revealed a thin membrane dividing the RA into 2 chambers. The proximal and distal chambers of RA were connected to the inferior vena cava (IVC) and superior vena cava (SVC), respectively. The TR-MRA (Figure 2) showed a strongly enhanced distal chamber of RA with restriction of contrast media distribution and an unenhanced proximal chamber RA on the multiple phases of contrast dynamics. The reformatted 3D LGE images (Figure 3) showed a thin and high septum from the eustachian valve (EV) between the IVC and coronary sinus (CS) orifices and an enlargement of IVC and hepatic vein (HV). Sequentially, a catheter-based conventional angiography (Figure 4) was performed for further evaluation of RA. The septum from the EV disrupted the catheter approach to the CS in the cardiac intervention session.

The cor triatriatum dexter (CTD) is characterized by the presence of a fibromuscular membrane dividing the RA into proximal and distal chambers and is rarely found in adults.1 The EV takes the form of a thin ridge-like crescent and generally arises from the anterior rim of the IVC orifice.2 If its structure and attachment to the atrial septum are large and high enough to define the giant EV, it can give the appearance of CTD. With advanced technique, cardiac MR imaging for the RA especially has become increasingly important to provide a preprocedural roadmap for necessary intervention. TR-MRA involves rapid sequential imaging of an anatomic volume during the dynamic intravascular passage of a contrast bolus and enables the identification of complex vascular flow kinetics.3 LGE imaging has been widely used for assessing the viability of myocardium because it permits clear visualization of myocardial fibrosis. Furthermore, the use of 3D LGE sequence permits acquisition of entire heart data in a single scan and viewing of any desired plane of the heart by reconstruction of the acquired 3D data.4

In summary, we described a rare case of CTD and a giant EV using TEE and cardiac MR examination, which consisted of TR-MRA, cine, and 3D LGE images for preparation of catheter ablation. The knowledge of various cardiac MR findings in the assessment of RA structures may lead to proper cardiac intervention in the necessary of CS approach.

Disclosures

None.

References

Figure 1. Transesophageal echocardiography (TEE) and cine cardiac MR examination show 4-chamber images for the evaluation of cardiac function and thrombus. Four-chamber TEE image (A) demonstrates the part of membrane and nodular structure (arrow) adhering to the atrial septum in the right atrium. Four-chamber cine MR image (B) shows irregular and thin membrane (arrows) connected between the atrial septum and posterior wall of right atrium.

Figure 2. Cardiac time-resolved MR angiography (TR-MRA) series include the 3-dimensional volume rendering, transverse, and sagittal reconstruction images, which allow each phase of contrast enhancement within the cardiac chamber to be viewed from different perspectives. On every fourth phase of TR-MRA, the sharp partition and limited distribution of contrast media within the right atrial chamber (arrows) are demonstrated.
Figure 3. Sagittal and transverse 3-dimensional late gadolinium enhancement (LGE) images (A and B) show detailed appearance of a giant eustachian valve (arrow) arising from the proximal portion of right atrium. In addition, there is enlargement of inferior vena cava (IVC) and hepatic vein (HV), indicating the restriction of blood flow into the right heart. CA indicates coronary sinus; RA, right atrium; RV, right ventricle; and RVOT, right ventricle outflow tract.

Figure 4. Catheter-based conventional angiography shows stasis of contrast media (arrow) along right atrial thin but high septum (giant eustachian valve) between inferior vena cava (IVC) and enlarged coronary sinus (CS) in the right atrium (RA).
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Sung Ho Hwang and Yu-Whan Oh

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