

EDITORIAL

Is preprocedural imaging before radiofrequency catheter ablation of atrial fibrillation and image integration useless?

Preprocedural imaging usually involves a cardiac CT which allows delineation of the pulmonary vein–left atrium anatomy so that the operator is aware of the anatomical variants even before the ablation procedure. It is much more accurate than intraprocedural angiography of the left atrium previously used. Other techniques used include preoperative rotational CT angiography or MRI and integration of the images with the electroanatomical map created during the procedure. The use of intracardiac echocardiography has enabled better intraprocedural imaging but still lacks the clarity provided by cardiac CT imaging.

1 | IMAGE INTEGRATION

Image integration was reported by Kistler et al¹ to show a significant reduction in procedure time and fluoroscopy time together with better clinical outcomes. Whilst useful it was quickly recognized that there can be volume changes especially if the CT scan had been done sometime prior to the ablation procedure. Also, the patient may have a different rhythm during the CT scan compared with during the procedure. This can cause slight volume shifts as well.²

Another problem was that there may be image shifts during a prolonged procedure with increased volume loading especially when using impedance based 3D mapping systems. The process of accurate image integration also can take a long time thus prolonging the procedure time. Thus, while accurate initially, the shifts that can occur as described earlier renders the image no longer as accurate as initially. Thus, Kistler et al in another report 2 years later reported that it did not significantly improve the clinical outcome.³

The meta-analysis by Mammadi et al⁴ in this journal shows that image integration to guide RF ablation for AF does not improve clinical and procedural outcomes. This conclusion is correct if one tries to accurately integrate the CT images with the electroanatomical map created during the procedure and perform the ablation using the integrated map alone. This is because the integrated map may not be completely accurate as slight shifts may occur from the pre-procedure acquired map and the intraoperative map. These slight shifts can be significant in critical areas such as the LA-PV ridge. The meta-analysis is also hampered by the lack of studies that could be included as shown by the selection of only 4 studies that were done

in the early 2000s. They included techniques of ablation such as linear ablation which could have resulted in increased proarrhythmia postablation. The technique of ablation has evolved since then and it is now recognized that the challenge of catheter ablation of AF is no longer the anatomy but rather the durability of the lesions that circumferentially isolate the pulmonary veins. The durability is more often due to adequate tissue contact, power, duration of energy delivered and ablation strategy.

2 | BEYOND IMAGE INTEGRATION

The advantage of a preprocedure cardiac CT is that it provides a clear definition of the number of pulmonary veins, presence of common ostium and accessory veins if any. Thus, it allows the operator to quickly create the correct electroanatomical map and proceed with ablation with or without any attempt at image integration.

The CT may also help to detect a left atrial thrombus that had not been previously assessed by transesophageal echocardiography. Additionally, many older AF patients have associated underlying coronary artery disease and these may be detected during the same examination.⁵ The early detection of coronary artery disease followed by appropriate treatment is important in the overall management of the AF patient.

The main disadvantage of the CT scan is the additional radiation exposure to the patient. If patients have had previous CT coronary studies done for coronary artery disease evaluation, the image can be reprocessed to give an idea of the PV anatomy.

In conclusion, whilst image integration has significant limitations as demonstrated by the paper by Mammadi et al, it does not imply that the preoperative imaging is useless. It remains useful for evaluation of the anatomical variants if any, detection of left atrial appendage clot and coronary artery disease if any.

CONFLICT OF INTEREST

None.

Wee Siong Teo 

Electrophysiology and Pacing, National Heart Centre, Singapore, Singapore

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Correspondence

Wee Siong Teo, Electrophysiology and Pacing, National Heart Centre, 5 Hospital Drive, Singapore 169609, Singapore.
Email: teo.wee.siong@singhealth.com.sg

ORCID

Wee Siong Teo  <https://orcid.org/0000-0001-5806-7337>

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