ventricular ejection fraction, history of myocardial infarction, heart failure, number of intracardiac leads, and warfarin therapy between the groups. The potential causal relationship between lead mobile echodensity/thrombus and elevated pulmonary artery systolic pressure and its clinical significance warrant further study, but our study results clearly validate a role for ICE in identifying a mobile versus fixed thrombus on device leads.

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REPLY

I thank Ren and Marchlinski for their interest in our study and sharing their experience with the detection of mobile echodensities on intracardiac leads during percutaneous ablative procedures with intracardiac echocardiography (ICE). The authors need to be congratulated for showing that ICE can detect the presence and location of mobile echodensities on right-sided leads; however, they did not describe whether differentiation of the location of echodensities on the implantable converter-defibrillator lead versus the right atrial or the right ventricular lead was possible in some or all of their patients. The severity and etiology of pulmonary hypertension in those with echodensities are not indicated, but could be related to pulmonary thromboemboli. Their patients did not have clinical evidence of or suspected endocarditis, and identification of echodensities or differentiation of the locations of these densities on various intracardiac leads likely did not lead to a change in therapeutic decisions, unlike in our series. We agree with Ren et al. regarding the limitations of 3-dimensional (3D) echocardiography with respect to the learning curve; however, spatiotemporal resolution is constantly improving, acquisition times are short, and newer techniques allow 3D rendering in 1 instead of multiple cycles. Reconstruction after image acquisition remains a challenge and is a function of operator expertise. I also agree with the ability of ICE to delineate intracardiac leads and unexpected thrombi attached to them. This role is particularly important in visualizing left-sided catheters as well as details of mitral valve anatomy during percutaneous mitral valve procedures, thereby allowing the operator to manipulate the catheters accordingly, as our own experience suggests (1). ICE is more invasive than transesophageal echocardiography (TEE) and carries a higher risk of complications. Although 3D ICE is to be available soon, at present, it remains a monoplane 2D imaging technique, thus prone to nonvisualization of structures not in the ICE imaging plane and for incomplete visualization of structures due to limited manual manipulation of the single imaging plane. Limited spatial resolution, as seen in Figure 1, specifically panel B, by Ren et al., also remains a limitation. ICE carries a steep learning curve, the ICE catheter is expensive, and, at present, its use remains limited to guidance during percutaneous procedures such as device closures of atrial septal defects and patent foramen ovale and during ablative electrophysiology procedures as used by Ren et al. ICE is not routinely used as a diagnostic echocardiography procedure in patients with suspected endocarditis due to the limitations outlined here. It is to be noted that ours was a series of case reports and not a systematic study evaluating the ability of 3D TEE to detect the location of vegetations on the right-sided structures (2). Such a study is indicated to clarify the role of 3D TEE in assisting with therapeutic decision making in such patients.

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