Response by Rillig et al to Letter Regarding Article, “An Unexpectedly High Incidence of Stroke and Left Atrial Appendage Thrombus Formation After Electrical Isolation of the Left Atrial Appendage for the Treatment of Atrial Tachyarrhythmias”

In Response:
We are grateful for the letter from Briceno et al1 and their interest in our published data. We take this opportunity to clarify some of the issues raised in their response letter.

First, our nonrandomized study presented findings that demonstrated the high incidence of left atrial appendage (LAA) thrombus after wide-area LAA isolation (LAAI). The mechanism of this high incidence of thrombus formation within the LAA remains unclear whether due purely to the isolation itself or to the combined effect of disease progression and the wide area of LAAI. This needs further investigation in subsequent studies. Because of the potentially significant clinical implications, we felt that these important findings must not be withheld from other electrophysiologists.

Second, regarding the technique of LAAI in our study population,2 we fully agree with Briceno et al that a wide-area LAAI is different from the LAAI technique described by Di Biase et al,3,4 which is more or less restricted to local ablation close to the base of the LAA and may have a lower chance of persistent isolation of the LAA. The risk of LAA thrombus formation using this technique might be lower, as was shown in the recently presented data from the BELIEF trial.4 We have emphasized that the difference between these 2 techniques in isolating the LAA may play a critical role in the subsequent risk of thromboembolic stroke.2 Also, we agree that wide-area LAAI might be one of the most critical factors that leads to the high rate of LAA thrombi in our study.

Third, the patient population in both studies was different. Our patients may have more diseased left atrium, with extensive areas of low amplitude in the left atrium, with larger left atrial volumes, and with more attempts at previous ablation compared with their patient population. A randomized study will be required to answer this question. Given that LAAI can occur by chance and unintentionally during ablation of complex fractionated atrial electrograms, we emphasize that this information is even more important to disseminate, and we conclude that LAA conduction should be closely monitored during extensive complex fractionated atrial electrogram ablation.

Importantly, there was no significant difference between the LAA flow velocities of patients with and without LAA thrombus after LAAI, but flow velocity was significantly reduced in the overall LAAI group as compared with the matched control group.1 Unfortunately, left atrial mechanical function of the isolated area was not determined in our study. This might be of interest in future studies and potentially give further insights in the definite mechanism of LAA thrombus formation after LAAI. Thus far, wide-area LAAI does not absolutely lead to LAA thrombus formation in every case but remains a significant risk factor for development of LAA thrombus.

In regards to the anticoagulation regimen, there was some heterogeneity in the study population. Of note, patients on oral anticoagulants were either continuously on novel oral anticoagulants or treated with phenprocoumon. All the patients with LAI thrombi had several transeosophageal echocardiographies before the intervention (because of previous ablation procedures or electric cardioversions) without any thrombus formation identified prior. This further illustrates that LAAI might have had a significant impact and may have ultimately lead to thrombus formation. Finally, LAAI was not confirmed during the follow-up period in all patients.

In conclusion, we agree that future studies with larger series of patients with persistent LAAI are needed to clarify the final mechanism of LAA thrombus formation in patients treated with this ablation technique.

Disclosures
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