



**COMPUTED  
TOMOGRAPHY AND  
TRANSESOPHAGEAL  
ECHOCARDIOGRAPHY  
FOR LEFT ATRIAL  
APPENDAGE EVALUATION:  
HOW MUCH IS TOO MUCH?**



**Reply to the Editor:**

With great interest, we read the Letter to the Editor by Mahamoud and colleagues.<sup>1</sup> The authors propose the use of transesophageal echocardiography (TEE) and computed tomography (CT) for evaluating left atrial appendage (LAA) morphology and thrombus formation preoperatively, as well as LAA closure efficacy postoperatively. Although we agree that the resolution and diagnostic accuracy of a CT scan are higher than those of a TEE, we do not think that a preoperative CT scan is necessary to evaluate the LAA before concomitant surgical atrial fibrillation ablation with LAA closure. In patients with other reasons for a CT scan (eg, access planning in minimally invasive procedures or evaluation of the calcification of the ascending aorta), preoperative CT evaluation of the LAA is a nice adjunct. However, in our opinion, it is not mandatory for concomitant LAA closure procedures, especially considering the additional radiation dose of a CT scan.

Because intraoperative TEE is now the standard of care in our daily practice, we do not need additional preoperative TEE evaluation of the LAA for concomitant surgical LAA closure. It is essential to have intraoperative TEE to first rule out thrombus formation before addressing the LAA intraoperatively, so that in the case of an LAA thrombus, an adaptation of the LAA closure strategy (eg, open thrombus removal) can be conducted. Furthermore, intraoperative TEE allows us to finally evaluate the LAA closure result.

We agree with the authors that CT might have an additional benefit over TEE imaging in terms of postoperative evaluation of LAA closure success. The high sensitivity of CT imaging allows for the detection of even small pouches and thrombi. However, because there are no data on the clinical relevance of such small pouches and micro-thrombi smaller than 2 mm, further research is necessary to evaluate the clinical consequences of these findings.

We also agree with the authors that the lack of a standardized intraoperative TEE protocol and the lack of serial TEE measurements are limitations of our retrospective study. This is especially significant

because we are not able to define the time point of LAA closure failure/recanalization in techniques like external LAA ligation. However, we believe that instead of searching for a time point of LAA ligation failure, it is essential to abandon those unsuccessful LAA closure techniques. There are established and proven successful closure techniques like LAA clipping or surgical resection.<sup>2,3</sup> Significant reduction of postoperative stroke has been shown for these latter LAA closure techniques in the left atrial appendage occlusion study III, whereas external LAA ligation, most likely for good reasons, was not allowed in this study.<sup>4</sup>

Furthermore, if those established techniques are applied correctly, there are no late failures to expect. This has been exemplarily shown for LAA clipping by previous TEE and CT investigations.<sup>2,3</sup> Therefore, in techniques like LAA clipping or LAA resection, where recanalization is technically not possible, an intraoperative TEE showing successful LAA closure without residual pouch is probably sufficient, and no further TEE or CT follow-up is mandatory.

Nevertheless, to date, we have no prospective randomized data to support the cessation of oral anticoagulation after successful surgical LAA closure. Therefore, consistent with guidelines, oral anticoagulation therapy must be continued according to the CHA<sub>2</sub>DS<sub>2</sub>-VASc score.<sup>5</sup> In the future, randomized studies are needed to evaluate the possibility of cessation of oral anticoagulation after successful surgical LAA closure.

If those trial data eventually allow for the cessation of oral anticoagulation therapy after successful surgical LAA closure, then more rigorous follow-up methods like CT scans, with high sensitivity to rule out micro-thrombi, might become more important to guide decision making.

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**Conflict of Interest Statement**

The authors reported no conflicts of interest.

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