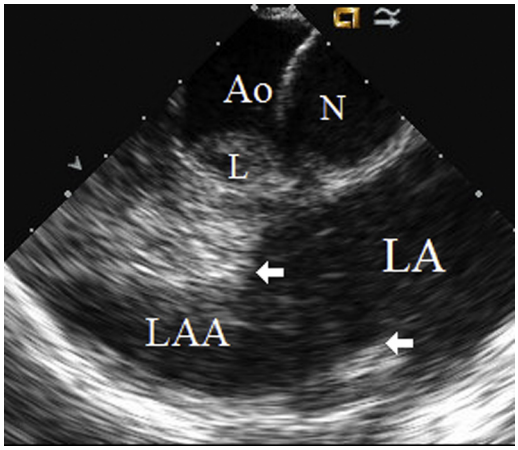
FIGURE 1 Intracardiac Echocardiographic Imaging of LAA With a Windsock-Like Body



With the transducer placed in the right ventricular outflow tract showing left atrial appendage (LAA) and its ostium **(between the 2 arrows)** as well as immediately LAA ostial adjacent structure during systole. Ao = aorta; LA = left atrium; L = left aortic cusp; N = noncoronary aortic cusp.

LAA morphologies, or procedural success. ICE monitoring may greatly reduce or prevent some of these complications, such as pericardial effusion (n = 33) and thrombus formation or embolization (n = 10). In addition, these complications should be also related to widely combined or concomitant procedures (e.g., percutaneous coronary intervention, closure of patent foramen ovale or atrial septal defect, transcatheter aortic valve replacement, mitral clip insertion, atrial fibrillation ablation, or transseptal catherization) and their procedures using only fluoroscopy and without guidance and monitoring of ICE or transesophageal echocardiography.

The investigators should be congratulated for presenting a large series of LAA closures and reported very early (1 week) outcomes. However, their methodology and analysis of major complications are inadequate and the LAA closure outcomes are also confounded mainly due to a complicated and impractical classification of LAA morphology and insufficiency of imaging technique.

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REPLY: Complicated and Impractical Classification of LAA Morphologies

How to Relate to LAA Closure Procedures?

We appreciate the interest of Dr. Ren and colleagues in our study assessing early outcomes of left atrial appendage (LAA) closure with Amplatzer devices (1). Using the same argumentation and wording as in their previous commentary (2) on a study by De Biase et al. (3), the authors refer to the classification of LAA morphology in our study as "complicated and impractical." On the basis of their own clinical experience with intracardiac echocardiography (as summarized in a representative figure), Ren and colleagues argue that essentially all LAAs share a windsock-like morphology. This statement is refuted by robust evidence of substantial heterogeneity in LAA morphology as assessed in pathological studies as well as in vivo by means of various imaging modalities (3,4). The classification of LAA shape as windsock, chicken wing, cauliflower, or cactus is well established (3,4), is based on straightforward, reproducible measures, and was applied with a high level of interobserver agreement in our dataset (1).

The authors question the value of our analysis exploring the association of LAA morphology with procedural outcomes. Previous studies consistently showed differential impact of varying LAA morphologies on the risk for thromboembolic complications in patients with atrial fibrillation, as well as differential effects on healing responses following LAA closure in pre-clinical models. Against this background, our study demonstrates that procedural success and early adverse events do not differ significantly across various LAA morphologies, in an unselected cohort of

consecutive patients who were deemed eligible for the intervention and were treated exclusively with Amplatzer devices (1). Acknowledging limitations common to nonrandomized investigations, this information is novel, meaningful, and clinically relevant in the context of device selection in patients who are considered suitable for LAA closure and present with various LAA anatomies.

Dr. Ren and colleagues consider the rate of early major adverse events in our cohort (5.8%) relatively high. The rate needs to be interpreted in view of the broadly inclusive definition of major adverse events in our study (1) compared with previous investigations using other devices (5). Although we acknowledge that procedural transesophageal echocardiographic guidance is currently recommended over solely fluoroscopic guidance and may add incremental information (1), the authors' argument that the routine use of intracardiac echocardiography "may greatly reduce" periprocedural adverse events compared with fluoroscopic guidance remains purely speculative, as the optimal imaging modality has not been determined in a comparative investigation. Moreover, our analysis showed similar rates and predictors of early adverse events in patients who underwent isolated LAA closure versus combined with other cardiac interventions (1).

Percutaneous LAA closure is increasingly appreciated as a valuable treatment option in properly selected patients with atrial fibrillation. Further insights from original contributions are essential to advance current knowledge in the field and better inform clinical practice, including studies with more refined imaging modalities to assess LAA morphology, guide LAA closure, and evaluate various devices.

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