

EDITORIAL COMMENT

Lessons From Drive-By Left Atrial Appendage Occlusion*



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The paper by Koskinas et al. (1) in this issue of *JACC: Cardiovascular Interventions* describes a large series of left atrial appendage closures (LAAC) and very early outcomes data. The authors' experience is admirable, dates back to the very beginning of endovascular LAAC, and incorporates a now obsolete device (Percutaneous Left Atrial Appendage Transcatheter Occlusion [PLAATO]) and a largely discredited approach (nondedicated Amplatzer devices, in particular atrial and ventricular septal occluders).

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The Amplatzer Cardiac Plug (ACP) (St. Jude Medical, St. Paul, Minnesota) used in this series lacks the robust evidence base of its competitor, the WATCHMAN device (Boston Scientific, Plymouth, Minnesota). Although the WATCHMAN has been the subject of 2 large randomized trials and a number of prospective registries with core laboratories and independent clinical events committees, the findings for LAAC outcomes in general remain somewhat muddled on critical analysis. This accounts in part for the need for 3 U.S. Food and Drug Administration panels before approval was finally granted 1 year ago, thus taking an unusual 17 years from patent application to initial device approval. In contrast, the ACP, despite widespread commercial availability outside the United States for the better part of a decade, has not been the subject of randomized multicenter trials. Thus, virtually the complete ACP dataset is on the basis of registries, mostly retrospective, and most without clinical events committees, core laboratories,

independent data oversight, or data safety monitoring boards. Until recently, the studies have been generally short term but in the past few years several larger, multicenter registries have been published. The study by Koskinas et al. (1) falls in this latter group, albeit with ultra short-term outcomes.

An unusual feature of the paper is that much of the data are derived from combined procedures: LAAC plus percutaneous coronary intervention (PCI), atrial fibrillation ablation, transcatheter aortic valve replacement, patent foramen ovale/atrial septal defect closure, or mitral clip insertion. From a clinical standpoint, the benefits of "drive-by" LAAC can be debated: patients benefit from fewer and more comprehensive procedures; at the same time, contrast load, fluoroscopy, and procedure times are increased. From a clinical trials standpoint, there are a number of drawbacks. Although the presence of a clinical events committee is laudable, assignment of causality in complex multi-intervention procedures is difficult and sometimes impossible. Inadvertent bias is suggested by the fact that there was a higher rate of events ascribed to LAAC when the procedures were done in isolation, raising the possibility of overly liberal assignment to concurrent procedures in patients having multiple simultaneous interventions.

The study has a number of unconventional elements of relevance to operators doing LAAC, in particular in the United States. First, the indications are on the basis of the European Society guidelines (2) and include patients with absolute contraindications to anticoagulation. This cohort, perhaps the population that most needs LAAC, does not benefit from a high level evidence base (although the ACP has been widely marketed for this indication) and as a result is specifically not approved in the United States. In general the indications in Koskinas et al. (1) are eccentric though they may represent "real-world" practice in Europe, and include LAAC for the sole

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indication of need for dual antiplatelet therapy (typically post-PCI) or simply for patient preference. Second, the methodology is also eccentric, in particular absence of ultrasound guidance. This certainly abbreviates procedure time but this reviewer believes that subtleties knowable only with use of careful, exhaustive, and somewhat tedious ultrasound measurements are likely to make a substantial difference in outcomes. Given the short follow-up, we cannot know how true outcomes might be affected in these patients. Without ultrasound, the 97.8% success rate needs to be interpreted in light of the authors' definition of success, which by necessity does not include echo derived requirements for device release such as absence of para-device leak or uncovered lobes. Importantly as well, transseptal puncture in fully anticoagulated patients has gained widespread adoption in the electrophysiology community but it does increase risk of pericardial effusion and tamponade. Acceptance of this approach has been predicated on enhancing safety with intracardiac or transesophageal ultrasound guidance, but that safety measure was omitted in this study. In general, it would be prudent to not take lightly subjecting already fully anticoagulated patients to fluoroscopy-only guided transseptal puncture.

The complication rate in this study is difficult to interpret but is arguably higher than one might have expected: the authors have exceptional experience and therefore are well past the usual learning curve. Thus they would be expected to have an unusually low rate of adverse events: in this study of 500 patients there were 10 embolizations and 33 pericardial effusions, of which 16 are described as major. There is no way to compare these data to the results of other studies, particularly to the randomized controlled trials, but one wonders if routine use of transesophageal echocardiography might have had a favorable effect on the 5.8% major adverse event rate. Finally, "consistent with manufacturer recommendations" and "previous evidence" were cited for discontinuation of oral anticoagulation immediately after device placement and maintenance of patients

solely on aspirin and clopidogrel. The references cited are among the better studies in the ACP published data, but unfortunately they still leave a very large vacuum in being able to assure patients regarding their overall risk with this approach.

The performance of multiple structural heart interventions in the United States is made the more prohibitive because third-party payers will not reimburse institutions for multiple simultaneous procedures. One could argue that this is short sighted, and exposes patients to separate sittings that actually drive up costs and, in some respects, risks. It is important to have an open mind about the multi-intervention approach used by Koskinas et al. (1); I was present to hear the outraged protests when the first combined thrombolytic therapy and rescue angioplasty was presented at a national meeting more than 3 decades ago. Nevertheless, extracting reliable conclusions from the fog created by ad hoc multiple interventions is difficult. A decade ago I watched a PLAATO device implanted into an LAA moments before closing an atrial septal defect before sheath withdrawal; it was pioneering and a technical tour de force, but it might be impossible to sort out the etiology of a subsequent neurological event.

The study by Koskinas et al. (1) does shed light on what is possible and as such is of interest to the structural heart community. For the large number of operators currently going through their learning curve, it is important to point out the benefits of most operators following the more standard practice of routine echocardiographic guidance for the foreseeable future. Going forward, there continues to be a need for randomized trials of the ACP, and, more importantly, for a high level evidence base that examines LAAC without post-implantation anticoagulation (3).

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