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Editorial Commentary

Simultaneous appendage ligation and atrial ablation – is it worth the risk?

Electrical isolation of pulmonary veins remains the mainstay for the treatment of atrial fibrillation (AF). Optimal ablation lesion set in persistent AF and long-standing persistent AF remains unknown and failed to demonstrate superiority beyond stand-alone pulmonary vein isolation (PVI) [1]. Left atrial appendage (LAA) has been increasingly recognized as an important source of non-PV triggers and reentry [2,3]. Hence, electrical isolation of LAA as an adjunct to PVI may significantly decrease the recurrence of AF [4]. However, the procedural complexity, potential risk of perforation, significant (>50%) reconnection rates, and systemic thromboembolism after LAA isolation remain a critical concern [5–7]. Electrical isolation of LAA impairs its mechanical contractility – increases blood stasis and risk of thrombus formation (above and beyond stand-alone PVI with electrically intact LAA). This increases LAA thrombus risk and systemic embolization despite continued oral anticoagulation in some cases and demands uninterrupted oral anticoagulation, possibly occlusion for stroke protection despite successful AF rhythm control after an ablation. A strategy of sequential LAA ligation followed by PVI has shown to improve ablation outcomes, and a randomized control trial has recently been completed with results pending [8,9]. Sequential LAA ligation and ablation during two separate procedures has been the common strategy, however, simultaneous LAA ligation and ablation during the same procedure has not been studied.

In this issue of Indian Pacing and Electrophysiology, Nentwich et al. report safety and long-term outcomes of concomitant AF ablation with LAA ligation with endoepicardial system (Lariat device) in a single procedure in a very small cohort [10]. Nine patients (mean age 67 ± 10 years, normal left ventricular systolic function, mean CHA_2DS_2VASc 4 ± 1.1 and HAS-BLED score 2.1 ± 0.78) with long-standing persistent AF underwent PVI and additional ablation (at operator discretion based on high-density bipolar voltage map) and concomitant Lariat device (LAA ligation) at high volume highly trained center in Europe. The study demonstrated 100% acute procedure success in LAA ligation with no intraprocedural LAA flow on transesophageal echocardiogram. There were no major acute procedural complications. All patients received three months of oral anticoagulation and six weeks of colchicine. 33% ($n = 3$) patients experienced major complications – non-disabling stroke (deemed not procedure-related and with no flow across LAA at 14 weeks), dressler's syndrome, and pericardial tamponade (due to prolonged pericardial inflammation, requiring pericardiocentesis). At 12 months follow-up, a transesophageal echocardiogram demonstrated no flow across in LAA in all patients, with arrhythmia-free survival in 78% of patients ($n = 7$), and the remaining 22% of patients ($n = 2$) had a significant reduction in AF burden.

The current study is undoubtedly of great interest due to its timely clinical relevance. However, there are several drawbacks beyond its extremely small sample size. While the idea of shooting two birds with one shot is very attractive, this initial experience clearly shows that it may not be worth the effort.

The most compelling reasons for combining these two complex procedures are several folds. Both procedures share similar procedure steps (at least endocardially, besides apparent epicardial access); a combination procedure may potentially reduce the risk of procedure-related complications (vascular access, anticoagulation, access to the left atrium via transseptal approach), general anesthesia. In addition, patients would require a shorter duration on oral anticoagulation, fewer hospitalization, patient convenience, and overall reduced health care costs. This logic may be great for discussion, but the evidence is contrary. While there were no acute intraprocedural complications, there were significant subacute complications. The learning curve is definitely steep for operators who are not facile with routine dry pericardial access. Careful patient selection, preprocedural imaging, micropuncture epicardial access technique [11] and experience have been shown to improve overall procedure safety and mitigate complications. The procedure duration will be significantly longer, increasing the overall general anesthesia times. One major issue will be related to oral anticoagulation. Ligating LAA on uninterrupted oral anticoagulation could significantly increase intraprocedural bleeding complications. The ongoing LAA tissue necrosis combined with continued OAC could increase the risk of hemorrhagic pericarditis and increased subacute tamponade. This risk becomes even higher when extensive ablation of the left atrium, especially the posterior wall, is performed for most of these long-standing persistent AF patients. It becomes a perfect set up long-term issues related to pericarditis. The other factor that the authors did not comment on are the neurohormonal and hemodynamic changes that most of the patients who undergo LAA exclusion with a Lariat or AtriClip or surgical ligation experience. Patients often experience neurohormonally driven systemic hypotension, pre-renal syndrome with transient fluid retention that could complicate the clinical course [12–15].

While the aMAZE trial may answer the added value of LAA ligation to ablation strategy for rhythm control in non-paroxysmal AF patients, it will not answer whether a simultaneous LAA ligation and ablation strategy is superior to the sequential approach that was used in that study. Based on our clinical experience and the relatively higher combined morbidity of these two procedures suggest that combining these two procedures may not be in the best interest of patient outcomes. 33% subacute complication rate

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despite excellent procedural performance clearly points dramatically increased patient morbidity from combining these two complex procedures. As our experience has taught us over the last decade, a sequential approach will help us to safely perform adjunctive electromechanical LAA isolation while improving the efficacy of AF ablation.

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