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Commentary: Closing the "gaps," single-stage or two-stage minimally invasive hybrid maze?

Vijay S. Patel, MD, and Richard Lee, MD, MBA

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CENTRAL MESSAGE

Despite improvements in techniques, technologies, outcomes, and safety of MIS treatment of AF, challenges persist to close the "gaps" and gain widespread acceptance among the surgical community.

Current guidelines recommend invasive endocardial catheter ablation (CA) for patients with atrial fibrillation (AF) refractory to medical management; however, CA has poor long-term outcomes, particularly in the most challenging patients with persistent AF or patients with longstanding persistent AF.[1] The Cox-maze III (CM-III) open cut-and-sew surgical procedure has significantly better long-term outcomes in this challenging group of patients and is considered the gold standard of surgical ablation (SA).[2] Despite numerous single-center studies reporting similar long-term outcomes, the CM-III procedure failed to gain widespread acceptance due to its highly invasive and complex technique requiring cardiopulmonary bypass. Instead, the surgical community embarked on efforts to develop alternative minimally invasive (MIS) SA techniques with and without cardiopulmonary bypass, embracing new technologies to create transmural ablation lesions replacing the cut-and-sew procedure, exceed CA outcomes with acceptable safety profile, and duplicate the CM-III outcomes.[3-7]

The article by Zheng and colleagues[8] is a feasibility study to move the needle further toward the classic CM-III anatomy-based bi-atrial lesions using an MIS beating-heart thoracoscopic SA technique combined with single-stage endocardial CA. In a cohort of 27 patients, freedom from atrial tachyarrhythmia (AT) with or without antiarrhythmic drugs after a single hybrid procedure was 64% and 60% at 12 months, respectively, and the addition of a redo CA increased the freedom from atrial tachyarrhythmia to 77.8% and 74.1% at 12 months, respectively. The left and right atrial size decreased in patients maintaining sinus rhythm. The hybrid concept is not unique, although the bi-atrial surgical technique is an improvement to previously reported primarily left atrial thoracoscopic SA albeit with variable additional lesions interspersed between studies. Their outcomes are acceptable but lack significant improvement to outcomes reported in the literature by numerous other centers.[9] The safety profile is admirable compared with other reports. The authors acknowledge the important limitations of their preliminary experience, including a small sample size with short follow-up preventing over-reaching conclusions of efficacy, challenges in their technique to achieve reliable mitral isthmus lesions, abandoned right atrium endocardial ablation in most patients, and the unreliability of assuring transmural linear lesions with the bipolar unidirectional radiofrequency device. A concomitant single-step hybrid CA procedure is obligatory, given the premise of this study; however, a 2-staged hybrid approach may avoid unnecessary CA procedure in some patients, reliably address pulmonary vein reconnection, and perform staged additional ablation lesions for failed index MIS thoracoscopic SA as noted by Lee and colleagues.[10] The authors' inability to approximate the CM-III ablation lesions and desired outcome is not unique to this study, given the technical challenges associated with an MIS

From the Division of Cardiothoracic Surgery, Department of Surgery, Augusta University, Medical College of Georgia, Augusta, Ga.

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Address for reprints: Richard Lee, MD, MBA, Division of Cardiothoracic Surgery, Department of Surgery, Augusta University, Medical College of Georgia, Augusta, GA (E-mail: ricklee@augusta.edu).

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beating-heart thoracoscopic ablation with or without complementary hybrid CA, the currently available alternative ablation technology to assure transmural lesions, the paucity of data on mechanisms of ablation failure to refine procedural techniques, heterogeneous hybrid ablation protocols in reported studies, absence of convincing literature to support single-step versus 2-stage hybrid approach, incomplete understanding of the pathogenesis of AF, and lack of convincing randomized controlled trials. Perhaps, their contribution will rekindle future studies among the surgical community to embrace a bi-atrial ablation protocol also proposed by Cox and colleagues[11] in their template for the "hybrid Cox-maze-IV" procedure for longstanding persistent AF.

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