

Is it safe navigating the maze through a keyhole?

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Atrial fibrillation (AF) poses significant burden to patients, physicians, and healthcare systems globally and its complexity warrants a multifaceted, holistic, and multidisciplinary approach in treatment strategy (1, 2). To effectively manage AF, both surgeons and electrophysiologists should speak the same language and the therapy strategy should be tailored down to the etiology and symptoms posed by the patients.

In recent years, there has been substantial progress in identifying and managing AF by not only electrophysiologists, but also surgeons. The proper surgical treatment of AF substantially affects survival and outcomes, requiring surgeons to incorporate rhythm surgery into their regular procedures. LAAOS III substantially demonstrated the effectiveness and benefits of incorporating AF treatment, albeit in part, into cardiac surgical procedures (3). Since its first description by Cox, there has been several modifications to the original concept of a maze pattern. Those that have proven to be as effective as the original maze pattern are the concepts that mostly adhered to the original patterns described by Cox: and these are the Maze II, Maze III and Maze IV procedures (4). The Maze IV replaced the previous cut-and-sew method with a combination of bipolar radiofrequency and cryoablation hence permitting AF treatment to be performed minimally invasive.

Tao Yan and colleagues try to find out in their study, whether modified off-pump biatrial mini-maze could have a good clinical performance for patients with atrial fibrillation (5). For this, they retrospectively examined 102 patients with long-standing persistent atrial fibrillation who received their modified mini-maze procedure using bipolar radiofrequency ablation. There was no mortality, no surgical re-exploration for bleeding, and no permanent pacemaker implantation. The intraoperative cardioversion rate was 42.2% 56 (43/102). A follow-up at interval of 3, 6, 12, 24, 36, and 48 months showed a success rate free from long-standing persistent atrial fibrillation was 95.1% (97/102), 94.4% (85/90), 94.8% (73/77), 91.5% (54/59), 90.3% (28/31) and 86.4% (19/22). Freedom from atrial fibrillation off antiarrhythmic drugs was 88.2% (90/102), 85.6% (77/90), 81.8% (63/77), 78.0% (46/59), 74.2% (23/31), and 68.2% (15/22), respectively. Finally, they have also shown that their modified off-pump biatrial procedure is safe and feasible. Therefore it might be a potential alternative to treating atrial fibrillation.

This study further strengthens notion that by combining the success rate of surgical ablation with less invasive approach the minimally invasive treatment of AF is safe and effective. The surgical approach has several advantages, such as ganglion plexus ablation and left atrial appendage exclusion as well as additional left atrial ablation lines, which can be created in non-paroxysmal AF patients. Cardiac surgeons mostly view rhythm surgery as a burdensome obligation that may be arbitrarily performed and in so doing causing more harm than good to the patients. We need more studies like this to encourage proper and effective management of AF while having in mind what a huge impact it may have on our patients in terms of survival and outcome.

References

1. Iribarne A, DiScipio AW, McCullough JN, Quinn R, Leavitt BJ, Westbrook BM, Robich MP, Sardella GL, Klemperer JD, Kramer RS, Weldner PW, Olmstead EM, Ross CS, Malenka DJ; Northern New England Cardiovascular Disease Study Group. Surgical Atrial Fibrillation Ablation Improves Long-Term Survival: A Multicenter Analysis. *Ann Thorac Surg.* 2019 Jan;107(1):135-142. doi: 10.1016/j.athoracsur.2018.08.022.
2. Hindricks G, Potpara T, Dagres N, Arbelo E, Bax JJ, Blomström-Lundqvist C, Boriani G, Castella M, Dan GA, Dilaveris PE, Fauchier L, Filippatos G, Kalman JM, La Meir M, Lane DA, Lebeau JP, Lettino M, Lip GYH, Pinto FJ, Thomas GN, Valgimigli M, Van Gelder IC, Van Putte BP, Watkins CL; ESC Scientific Document Group. 2020 ESC Guidelines for the diagnosis and management of atrial fibrillation developed in collaboration with the European Association for Cardio-Thoracic Surgery (EACTS): The Task Force for the diagnosis and management of atrial fibrillation of the European Society of Cardiology (ESC) Developed with the special contribution of the European Heart Rhythm Association (EHRA) of the ESC. *Eur Heart J.* 2021 1;42(5):373-498. doi: 10.1093/eurheartj/ehaa612. Erratum in: *Eur Heart J.* 2021 1;42(5):507. Erratum in: *Eur Heart J.* 2021 1;42(5):546-547. Erratum in: *Eur Heart J.* 2021 21;42(40):4194.
3. Whitlock RP, Belley-Cote EP, Paparella D, Healey JS, Brady K, Sharma M, Reents W, Budera P, Baddour AJ, Fila P, Devereaux PJ, Bogachev-Prokophiev A, Boening A, Teoh KHT, Tagarakis GI, Slaughter MS, Royse AG, McGuinness S, Alings M, Punjabi PP, Mazer CD, Folkeringa RJ, Colli A, Avezum Á, Nakamya J, Balasubramanian K, Vincent J, Voisine P, Lamy A, Yusuf S, Connolly SJ; LAAOS III Investigators. Left Atrial Appendage Occlusion during Cardiac Surgery to Prevent Stroke. *N Engl J Med.* 2021 3;384 (22):2081-2091. doi: 10.1056/NEJMoa2101897.
4. Cox JL, Malaisrie SC, Kislitsina ON, McCarthy PM. The electrophysiologic basis for lesions of the contemporary Maze operation. *J Thorac Cardiovasc Surg.* 2019 ;157(2):584-590. doi: 10.1016/j.jtcvs.2018.08.007.
5. Yan T, Zhu S, Chen N, Zhu M, Zhu K, Wei L, Wang C, Guo C. An off-pump biatrial mini-maze procedure for long-standing persistent atrial fibrillation. *Eur J Cardiothorac Surg.* 2022 Jul 29;ezac400. doi: 10.1093/ejcts/ezac400.