Masters of Cardiothoracic Surgery

Simplified technique for bilateral access totally thoracoscopic Maze

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Submitted Dec 04, 2023. Accepted for publication Dec 22, 2023. Published online Jan 17, 2024.
doi: 10.21037/acs-2023-afm-0207
View this article at: https://dx.doi.org/10.21037/acs-2023-afm-0207

Clinical vignette

A symptomatic 56-year-old male patient with long-standing persistent atrial fibrillation (AF) was scheduled for bilateral thoracoscopic surgical ablation and left atrial appendage (LAA) exclusion. Previous medical history included multiple transcatheter ablations and cardioversions for AF recurrence.

Surgical technique

Preparation

The patient is laid supine, with two inflatable bags positioned along each scapula that are alternately inflated when the procedure switches from left to right.

Right side access

A camera port (10 mm) is inserted in the third intercostal space (ICS) on the mid-axillary line (0° scope) and two surgical working ports are placed in the second (5 mm) and fourth ICS (10 mm) on the anterior axillary line. The right chest is inflated with carbon dioxide aiming for lung collapse.

The pericardium is opened and suspended at least 2 cm above the phrenic nerve.

Blunt dissection is performed to access the oblique sinus (OS) and the transverse sinus (TS). The fat pad at the level of the Waterston's Groove is removed to optimize the possibility of achieving transmurality during radiofrequency (RF) ablation. The left-sided bipolar RF clamp (BRFc) (Isolator Synergy Clamp EML2, Atricure, West Chester, OH, USA) is then inserted using a dedicated GlidePath from the superior working port (second ICS) and placed into the OS. The procedure continues on the left side.

Left side access

Camera and working ports are placed mirroring the positioning on the right side. The pericardium is opened below the left phrenic nerve, exposing the LAA and the left pulmonary veins (PVs). Marshal's ligament is sectioned, then the TS is opened from the left side.

Left sided connecting lesions

The rubber end of the GlidePath previously abandoned in the OS is recovered, gently pulled underneath the left inferior (LI) PV and then outside the left chest from the upper port. The left BRFc is secured to the GlidePath and inserted into the cavity, the inferior jaw is driven into the OS. The upper jaw is inserted into the TS over the upper left PV. Then, RF is delivered, performing the left part of the connecting lesions.

Encircling of left PVs

From the inferior port, the rubber band (GlidePath) is guided by a tracklight dissector (Lumitip - MID1, Atricure Inc.) around the LIPV, thus accessing the TS from the LA posterior wall. This maneuver is performed as far as possible from the left PVs, with the exit point of the

Lumitip dissector usually midway between the upper PVs. Once encircling of left PVs is completed, the rubber band guides the BRFc through the lower port encircling the left PVs, then energy is delivered. Once completed, the rubber band is left in position around the PVs with the extremities abandoned in the OS (rubber band) and TS (plastic sheet).

LAA epicardial exclusion

The LAA epicardial exclusion device (AtriClip PRO2-Atricure) is introduced through the left lower port. The LAA is left to gently accommodate avoiding any grasping with the device oriented to be aligned with the LAA base. Attention must be paid towards the circumflex artery lying close by. Transesophageal echocardiogram and electrocardiogram should guide LAA exclusion. Finally, a second rubber band is abandoned into the OS with the distal end fixed outside from the upper port. The procedure is then shifted contralaterally.

Right sided connecting lesions

The extremities of the rubber band left around PVs are retrieved from the TS and OS respectively. The second rubber band, previously abandoned into the OS, is pulled through the upper port and connected to the BRFc. This is guided into the OS (inferior jaw) and the TS (superior jaw) by gently pulling the GlidePath from the left side. Once RF energy is delivered, the right connecting lesions are completed.

Encircling of right PVs

The rubber band and BRFc are then removed. The plastic end around the PVs abandoned into the TS is retrieved from the superior port and the rubber end (OS) is retrieved from the lower port. Once out, this is connected to a new GlidePath and used as a guide. The new rubber band will guide the BRFc around the right PVs. Once the energy is delivered, the encircling of the right PVs is completed, as well as the box-lesion. The exit block of the PVs and LA posterior wall is tested by means of a steerable diagnostic catheter (pacing setting: VOO 20 mV output).

Comments

Our latest iteration of a totally thoracoscopic Maze surgical ablation allows one to perform connecting lesions between right and left PVs by means of a BRFc instead of a Linear Pen (Coolrail Linear Pen - Atricure). In fact, the RF linear "non clamping" transpolar device is considered per-se the main cause of gaps at the level of the roof and the floor of the box-lesion. By delivering energy from the epicardium, the circulating blood produces a "cooling effect" from the endocardium, thus hampering the chance of the RF energy to penetrate and produce transmural lesions (1). Conversely, a BRFc is able to deliver RF energy to the tissue engaged between the two jaws, thus excluding tissues from circulation. Furthermore, the procedure is completed by closing the LAA. Being excluded by means of an epicardial device, this allows for both full electrical isolation and hemodynamic exclusion, providing improved results in terms of rhythm outcomes and thromboembolic risk reduction. Excellent results can also be achieved in patients with complex anatomy (2).

Minimally invasive surgical ablation is a well-established therapeutic strategy for patients with drug-resistant AF or with previously failed catheter ablation, with a success rate of approximately 70% at three years (3). The best advantage of thoracoscopic AF ablation is the electrical isolation of LA posterior wall with recovery of the atrial function over time after sinus rhythm restoration, which is different from extensive repeated catheter ablation that induces atrial fibrosis and iatrogenic reduction of left atrial function, and may expose patients to unnecessary risk of complications (4,5). Further studies are warranted to better evaluate the effectiveness, reliability and reproducibility of this procedure.

Acknowledgments

Funding: None.

Footnote

Conflicts of Interest: S.B. discloses financial relationship with Atricure, Artivion, Allergan. E.L. discloses consultancy relationship with Atricure. The other authors have no conflicts of interest to declare.

References

1. Hassan SM, Hong K, Rosati F, et al. Hybrid ablation for atrial fibrillation: the importance of achieving transmurality and lesion validation. Minerva Cardioangiol 2019;67:115-20.
2. Rosati F, de Maat GE, Valente MAE, et al. Surgical clip closure of the left atrial appendage. J Cardiovasc Electrophysiol 2021;32:2865-72.
3. Muneretto C, Baudo M, Rosati F, et al. Thoracoscopic Surgical Ablation of Lone Atrial Fibrillation: Long-term Outcomes at 7 Years. Ann Thorac Surg 2023;116:1292-9.
4. Baudo M, Petruccelli RD, D'Alonzo M, et al. Rhythm outcomes of minimally-invasive off-pump surgical versus catheter ablation in atrial fibrillation: A meta-analysis of reconstructed time-to-event data. Int J Cardiol 2023;376:62-75.
5. Rosati F, Hassan SMA, Reid K, et al. Left atrium perforation with lung injury after catheter ablation. J Card Surg 2020;35:2860-2.

Cite this article as: Rosati F, De Cicco G, Lapenna E, Di Bacco L, Redaelli P, Benussi S. Simplified technique for bilateral access totally thoracoscopic Maze. Ann Cardiothorac Surg 2024;13(1):105-107. doi: 10.21037/acs-2023-afm-0207