Epicardial treatment of concomitant atrial fibrillation in non-mitral valve surgery

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Clinical vignette

A 57-year-old male patient with a history of paroxysmal atrial fibrillation (AF) came to the emergency room with symptoms of angina during an episode of AF. A coronary angiography confirmed a significant stenosis at the bifurcation of the left anterior descendens (LAD) and the first diagonal (D). The patient was planned for an on-pump left internal mammary artery D-LAD and epicardial pulmonary vein isolation and isolation of the posterior left atrium with a bipolar clamp.

Surgical technique

The patient was prepared as for a classic cardiac operation performed through a sternotomy and on bypass.

The exposition of this procedure is similar to a classic cardiac operation performed through a sternotomy and on bypass.

After sternotomy and opening of the pericardium, the pericardial reflection of the superior caval vein (SVC) and inferior caval vein (IVC) are bluntly dissected, with the hand or suction. A braid or rubber catheter is placed around the veins. This dissection will open a passage from the right side to the left side of the pericardial cavity, providing access to the oblique sinus and transverse sinus. The right pulmonary veins (PVs) are then accessed. A blunt dissection is performed between the right superior PV and the right pulmonary artery, lateral to the SVC. This can be done with a suction or by placing the index finger of the right hand posterior to the IVC into the oblique sinus, until it reaches the superior border of the posterior left atrium. The thumb of the right hand is introduced into the area between the right pulmonary artery and the right superior PV. Both fingers will touch each other, only separated by a thin layer of fatty tissue which can easily be opened by rubbing both fingers. A braid or rubber catheter is passed. This maneuver is similar to the blunt dissection of the pericardial reflection of the IVC we often do during cardiac surgery. The technique is repeated on the left PVs. Importantly, this dissection is more easily performed medial to the ligament of Marshall (LOM), since the tissues are less resistant in that area. Furthermore, this will also isolate the LOM, a potential trigger of AF. The lower jaw of the clamp is guided behind the left atrial cuff adjacent to the right PVs. The braid or rubber catheter is then removed, and correct positioning of the clamp on the atrium and not on the PVs is verified by means of direct inspection of the device after closing the jaws of the clamp. Several ablations are performed. The technique is repeated on the left side. The endpoint of PV isolation is entrance and exit blocks.

The next step is a connecting lesion between the right PVs and left PVs. This can be achieved by inserting the tip of the upper jaw of the clamp into the created anatomical space between the right superior PV and the right pulmonary artery, posterior to the SVC. The tip of the lower jaw is inserted in the created anatomical space between the right inferior PV and the IVC. The clamp is then gently moved forward, with the upper jaw crossing the transverse sinus (posterior to the great arteries) and the lower jaw crossing the oblique sinus. The clamp is then closed, crossing the previous ablation line on the antrum of the left PVs. This will create a bipolar roof and inferior line in a similar way as when performing PV isolation. Clamping of the posterior left atrium between the two jaws excludes

the effect of circulating blood on delivery of power, thereby eliminating the heat-sink cooling effect to the tissue and increasing the degree of transmurality. This maneuver is facilitated if the aorta is clamped and the left atrium is not filled.

The completion of this procedure is similar to a classic cardiac operation performed through a sternotomy and on bypass.

Comments

There are limited clinical results available as this procedure is not widespread, and it is therefore only a potential treatment option in patients with coronary artery disease or aortic valve disease. In our center, the results of the Maze procedure in mitral valve patients and the epicardial lesion set in non-mitral valve patients are similar (around 80%), with the understanding that the left atrial size (volume) is less in the epicardial group.

The proposed epicardial left atrial lesion set has the advantage of using the most reliable surgical ablation tool for the beating heart (a bipolar clamp) in a patient group that does not need an atriotomy. Therefore, it has the potential to reduce complication rates (no atriotomy, decreased pump and clamp time) and through its simplicity, increase the general adoption of this procedure not only by experts in the field of AF, but by every cardiac surgeon.

Caveats of this procedure include the limited understanding of the pathophysiology of AF. The 2012 HRS/EHRA/ECAS Expert Consensus Statement on Catheter and Surgical Ablation of Atrial Fibrillation recommended that a left atrial procedure should consist of at least pulmonary vein isolation, ideally with a connecting lesion to the mitral valve annulus. For patients with longstanding persistent AF, a biatrial procedure should be considered, and when it can be safely performed, complete occlusion of the left atrial appendage as well (1). Subsequently, this limited left atrial lesion set may be a suboptimal treatment in patients who perhaps require a more complete lesion set such as the Maze procedure.

As a final note, when performing the blunt dissection of the pericardial reflection of the PVs and the SVC and IVC, attention must be paid not to perforate the heart or one of the great cardiac vessels. Furthermore, when crossing the bipolar clamp from right to left, attention must be paid not to perforate the heart or one of the great cardiac vessels.

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