



Isolator Synergy EnCompass clamp: surgical notes

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Clinical vignette

We present the case of a 74-year-old diabetic male with hepatitis C, severe chronic obstructive pulmonary disease, new onset paroxysmal atrial fibrillation (AF) with rapid ventricular response, acute-on-chronic decompensated heart failure with reduced ejection fraction (EF) of 40%, chronic kidney disease, and severe peripheral vascular disease. The patient was admitted for non-ST-segment elevation myocardial infarction (NSTEMI). The left heart catheterization showed significant coronary artery disease with critical 90% proximal left anterior descending (LAD) stenosis, 80% mid heavily calcified right coronary artery (RCA) lesion, and 80% mid-circumflex (Cx) lesion. The decision was to offer on-pump beating heart coronary artery bypass grafting (CABG) (left internal thoracic artery to LAD, and saphenous venous graft from the aorta in sequential to posterior descending artery and the third obtuse marginal artery), left atrial appendage (LAA) exclusion with AtriClip Flex V 45 mm (AtriCure, Inc., Mason, OH, USA) and surgical AF ablation using EnCompass clamp (AtriCure, Inc.).

Surgical technique

Preparation

After median sternotomy, cardiopulmonary bypass can be established either by bicaval or single right atrial (RA) cannulation for the venous line. The first step is to encircle the superior vena cava (SVC) with an umbilical tape by creating a space between the SVC, the right superior

pulmonary vein (PV), and the dome of the left atrium (LA). Blunt dissection of the transverse sinus (TS) is then performed. Next, the fat between the RA and LA is removed until the development of Sondergaard's groove. This mobilization is carried caudally towards the inferior vena cava (IVC) until the oblique sinus (OS) is opened and the IVC can be freely encircled with an umbilical tape. At this point, the heart is elevated using a wet lap pad, and positioned towards the patient's right hip to expose the critical area of the LAA and the ligament of Marshall, which is then divided with electrocautery. The heart is then repositioned back inside the pericardial cavity.

Positioning of the Glidepath magnetic guide

The Glidepath consists of magnetized tips that allow for easy connection to each clamp jaw. The Glidepath is first passed via the TS underneath the aorta and the PV using a DeBakey vascular clamp. The same end is then guided underneath the SVC following the previously created plane. Next, the magnetic guide is gently positioned around the lateral wall of the heart and wrapped posteriorly and inferiorly around the LA. The free end of the Glidepath is then navigated via the OS under the IVC, completing the circumferential placement of the Glidepath around the posterior LA.

EnCompass positioning and ablation

The two ends of the Glidepath are connected to the corresponding jaws: the TS tip to the upper jaw and the

OS tip to the lower jaw. The closed loop of the magnetic guide is retrieved from the left side, which assists device positioning. First, the EnCompass with closed jaws is inserted parallel to the sternotomy and lateral to the LA. After passively opening the jaws, the device is directed towards the left shoulder by introducing the superior jaw underneath the SVC, the aorta and the pulmonary artery via the TS, and the inferior jaw via the OS to reach the left inferior PV. This can be achieved by holding the shaft of the device more horizontally and then lifting the closed loop and rotating the device. Avoid pushing the clamp into position to avoid tissue damage, it should easily pass with minimal resistance. Prior to clamp closure, confirmation of the clamp jaws lateral to the LAA base should prevent inadvertent ablation across the Cx. The ablation should be started after the device is placed into the final position and checked that no unintended tissue obstructs the jaws. Prior to ablation, withdrawing the transesophageal echocardiography probe to approximately 20 cm at the incisors is recommended to prevent tenting of the esophagus against the clamp, and to mitigate the risk of esophageal thermal injury. Moreover, ensure that an aortic root vent is in place and turned on, as microbubbles can form during ablations. The clamp is closed, and ablation is continued until transmural is reached within the first 5 seconds. Due to the double layer of atrial tissue (roof and floor), repeat ablations without opening the clamp jaws is often required to obtain transmural. This is generally repeated three times in three different areas a few millimeters apart. If the ablation is completed prior to cross-clamp and cardiac arrest, confirmation of complete LA isolation can be achieved with entrance block testing at each PV. The final step consists in the surgical management of the LAA with a clip.

Comments

Indications

Despite guideline recommendations for a class I indication for surgical treatment of AF during cardiac surgical procedures (1), the penetration of surgical ablation remains low (2). The EnCompass clamp was recently introduced by AtriCure Inc., in April 2022 as a new bipolar radiofrequency ablation tool for the surgical treatment of AF. This clamp can improve surgical ablation by creating simultaneously transmural lesions of the four “Box lesion” sides. By using this device, atriotomy is unnecessary and

cross-clamping can be avoided. In our practice, this device is used in patients with low EF undergoing CABG in which we want to perform on-pump, beating heart surgery, patients with a hostile aorta unsuitable for a cross-clamp, or patients needing surgical AF ablation in combined valvular and coronary surgery to reduce cross-clamp time. EnCompass clamp non-atriotomy ablation has been utilized to significantly reduce the incidence of post-operative AF in at-risk isolated CABG patients (3).

Advantages

The EnCompass clamp was uniquely crafted to produce the “Box lesion” with just one application. Utilizing this device could simplify Box lesion creation, eliminate the need for a left atriotomy, and therefore potentially enhance the acceptance of concomitant surgical AF ablation (4), compared to not performing an ablation at all. The clamp closes in a parallel fashion onto the tissue, exerting consistent pressure along the entire length of its jaws, with increased lesion depth and likelihood of delivering a transmural lesion (5).

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Footnote

Conflicts of Interest: G.T. receives consulting fee for Peters Surgical. A.K. receives consulting fee for AtriCure. The other authors have no conflicts of interest to declare.

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