ARIZONA HEART RHYTHM CENTER

LEADING PROVIDER OF ARRHYTHMIA CARE
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# LARIAT SUTURE DELIVERY DEVICE

The LARIAT Suture Delivery Device is a suture-based device used to occlude left atrial appendage. By means of standard techniques, similar to ones used in left atrial ablation procedure, a magnetic wire is placed inside of the left atrial appendage. Then, via a percutaneous epicardial approach, a second magnetic wire is placed in the sac of the heart (pericardial space) from outside by doing a tiny puncture below the breastbone. This second wire then finds the first magnetic wire in the LAA. Next, over this magnetic wire bridge, a LARIAT suture is inserted over the wire in the pericardial space to find the LAA and snare it, ultimately resulting in necrosis of the LAA. Following the procedure, the only thing that remains in the body is a suture ligating the LAA. The patient is observed overnight in the hospital and discharged the next day.

## PATIENT SELECTION

While no guidelines-based criteria have been set forth yet for the LARIAT system, current practice at our institution involves screening patients with nonvalvular AF and a CHADS2 risk score of 2 or higher. In addition, there must be an absolute or relative contraindication to long-term anticoagulation as well as no prior history of sternotomy or pericarditis. Formal consultation or documentation of the specific contraindication is obtained, as is the patient's assessment of risk for a short course of post-procedure anticoagulation.

## PRE-PROCEDURAL PLANNING

All patients screened for the LARIAT procedure undergo an extensive vetting process that starts with establishing eligibility. Pre-procedure imaging is one of the most critical aspects of planning and patient selection. Patients undergo CT angiography of the LAA with the same protocol that is used for EP planning of our AF ablations. The CTA findings are also reviewed by SentreHEART, who corroborate our evaluation of the LAA in terms of size, shape, orientation, and width. Nomenclature has also recently been established to describe the variants that may be encountered when reviewing the LAA; windsock, fan-shaped, or multi-lobed shapes have been described.1 Currently the first-generation LARIAT is restricted to LAA width of 40 mm, as the loop of the device must negotiate a fixed diameter as it snares the LAA. However, any appendage morphology that takes a course posterior to the pulmonary artery is contraindicated in the current LARIAT device.

## WORKFLOW

LARIAT procedures at our institution are performed in the hybrid OR in order to have prompt surgical backup if necessary. The LARIAT procedure is part of the structural heart program, and is done with the collaboration of the EP, interventional cardiology, and noninvasive cardiology departments. All

members of the team met the training guidelines set by SentreHEART, including didactic sessions, hands-on training, and observing live cases. Protocols and guidelines were established, and training pathways were reviewed and approved well in advance of our first case. Both interventional cardiology and EP nurses were trained as well as sonographers.

LARIAT procedures are done under general anesthesia, and start first with a transesophageal echocardiogram, performed to rule out LAA thrombus. Epicardial access is gained using standard technique with specific consideration to maintain an anterior approach, which is essential for procedural success. Our approach is to start with the AP view, targeting the needle toward the appendage guided by the CTA. We then strictly use the left lateral approach, using a 50/50 mixture of contrast as saline until pericardial staining is seen specifically with layering. Utilizing as little contrast as possible is suggested, in case multiple attempts are needed. Confirmation in orthogonal views, particularly the LAO view, is critical. Usually the wire can also be seen in the pericardium on TEE. We cannot emphasize enough the importance of obtaining access that is not only anterior but also coaxial to the LAA to allow the magnets to adhere successfully. After confirmation of pericardial access, a second wire is advanced to retain access, and sheaths are slowly and cautiously upsized to accommodate the 14 Fr suture delivery device sheath.

Heparin is then infused, and transseptal puncture is performed aiming for a mid-septal approach. The standard transseptal sheath we use for LARIAT procedures is an SL1 (St. Jude Medical). An atriogram is then performed in the LAO and RAO caudal views to further identify the LAA anatomy. A balloon occlusion device allows for further delineation of LAA anatomy and the closure line for the suture. The balloon is seen both on TEE and fluoroscopy. Utilizing a unique 0.025" magnetic tip FindrWIRZ® Guide Wire System (SentreHEART, Inc.), a wire is advanced endocardially via the transseptal sheath and positioned in the LAA. A second 0.035" FindrWIRZ is back-loaded into the LARIAT system and advanced epicardially. The magnetic tip on each wire will allow for the wires to meet. Positioning the endocardial wire in the most anterior lobe of the LAA will allow for best alignment. Once wires are determined to be coaxial, the LARIAT snare is advanced over the wire via the epicardial sheath. Re-inflation of the balloon confirms closure and that the suture is deployed; confirmation of LAA closure is determined via repeat LA atriogram and TEE color flow Doppler. A TenSURE™ Suture Tightener (SentreHEART, Inc.) is used to ensure that knots are delivered a consistent strength. A final atriogram is performed, and a confirmation that there is no leak is determined via TEE.

A pigtail drain is then directed posteriorly, and the pericardial space is monitored for an adequate waiting period before extubation.

## POST-OPERATIVE COURSE

As tissue necrosis ensues to the ligated LAA, patients have exhibited a wide variety of pericardial symptoms. Consequently, all patients maintain drains for 12-24 hours, even if minimal serous drainage is seen in the immediate post-operative period. Additionally, high-dose colchicine is used to prevent recurrent pericarditis. The use of intrapericardial steroids has not been recommended,

although no published data are available to help guide management. Our patients are admitted to the cardiothoracic ICU overnight, and then transferred to telemetry if they are not discharged the following day. Patient length of stay has ranged from two to five days. Longer stays have been due to pain management. Transthoracic echocardiograms were performed in all patients prior to discharge. Follow-up TEE is performed in all patients at 30 days to ensure complete ligation.