Robotic left atrial appendage ligation in the setting of previous sternotomy

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Background

- Thoracic procedures after previous sternotomy and cardiac procedures carry increased risk of myocardial infarction, conversion to thoracotomy, and mortality[1].
- Based on this, previous cardiac surgery has been felt to be a contraindication to transthoracic left atrial appendage (LAA) ligation[2] and has not been routinely offered, potentially depriving patients with atrial fibrillation (AF) the benefit of this procedure.
- Based on high rates of procedural success using a robotic approach and a combined cardiac and thoracic team in AF patients without previous surgery, we hypothesized that LAA occlusion clip placement could be performed safely in these patients.

Methods

Four patients with AF and a history of prior cardiac surgery were evaluated. Each had a contraindication to anticoagulation (AC), and each was not a candidate for Watchman placement. After discussion of the risks involved, each was taken to the operating room where a robotic approach was performed. The patients were placed supine with the left side bumped up, and standard robotic port placement and an assistant port was done. After taking down the adherent lung, the pericardium was opened and the LAA freed in its entirety. The LAA occlusion clip was then placed using intraoperative transesophageal echocardiogram (TEE) to confirm occlusion. Success was measured by intra-operative TEE to confirm complete occlusion of the LAA. Imaging (CT and/or TEE) was performed at 3 months to reassess the LAA.

Results

- 4 patients with previous cardiac surgery underwent successful left robotic AtriClip placement.
- Pathologic flow was undetected upon follow-up imaging at 3 months on CT and/or TEE.
- All 4 have/had discontinued AC therapy.

Table 1.	Patient 1	Patient 2	Patient 3	Patient 4
Age	78	74	64	73
Gender	MD	M 74	M	M
BMI	25.56	24.25	33.51	24.54
Chads2-VASc	5	5	2	5
HasBled	4	5	4	3
Previous Surgery	AVR/Repair ascending Aorta and HemiArch/CABG x 1 (LIMA-LAD)	CABG x 4 (LIMA-LAD, SVG-RCA, OM2, OM3)	CABG x 4 (LIMA-LAD, SVG-PDA, OM1, OM2)	MVR
Contraindication to AC	GI Bleeds	GI Bleeds / Frequent Falls	Pt Refusal / Easy bruisability	GI Bleeds
Watchman contraindication	LAA Anatomy	Difficult EGD	Refuses AC	LAA Anatomy / Possible Thrombus
LVEF	63%	58%	60%	38%
LA Volume (ml)	58.2	66.6	120.1	101
LA Volume Index (ml/m2)	30.1	34.3	49	53.8
AtriClip used	45mm Hoop	50mm V	50mm Hoop	50 mm Hoop
LOS	4	2	1	2
Intra-op TEE	LAA Occluded	LAA Occluded	LAA Occluded	LAA Occluded
Post-op Imaging	TEE at 3 months	TEE and CT at 3 months	TBD	TBD
Post-op Imaging Results	Residual LAA Stump - 12mm	No LAA	N/A	N/A
Anticoagulation	No	No	No	No
Still living	No	Yes	Yes	Yes
Cause of death	Complications of endocarditis	N/A	N/A	N/A

Table 1. Patient demographics and outcomes.

Conclusion

- Robotically assisted LAA occlusion using the AtriClip device can be performed safely in the setting of previous cardiac surgery.
- Utilization of the robotic platform and two surgeons, a cardiac and thoracic can facilitate navigating dense adhesions and adherent appendages.

Discussion

- The robotic platform, which allows 10x magnification and 7 degrees of freedom, facilitates safe mobilization of the LAA which is typically folded on itself and densely adherent to adjacent structures following cardiac surgery.
- Utilization of a two-surgeon approach, a cardiac and thoracic, each bringing their unique perspective and skill set, increases the safety of the procedure and likelihood of success.
- One patient had a residual stump of 12mm (Figures 1,2). The 10-mm remnant as a threshold for success is an arbitrarily chosen endpoint and has never been reported to be associated with a higher risk of stroke[2,3]. It is unclear if a 12mm remnant with a smooth geometry truly represents a “pathologic” LAA.

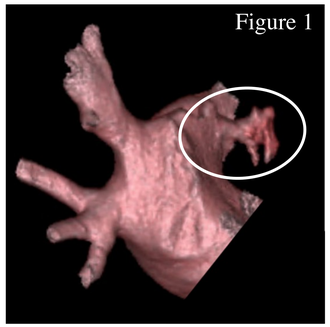


Figure 1. 3D reconstruction of the heart and appendage before Atriclip application.

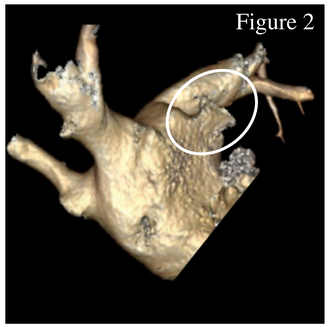


Figure 2. LAA after Atriclip application. 12mm depth of residual stump is not proven to be pathologic for clot formation.

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