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Journal Title: Journal of Cardiovascular Echography
Volume: Volume 30, Number 4
Publisher: The Italian Society of Cardiovascular Echography | 2020-10-01, Pages 211-213
Type of Work: Article | Final Publisher PDF
Publisher DOI: 10.4103/jcecho.jcecho_45_20
Permanent URL: https://pid.emory.edu/ark:/25593/vv6kj

Final published version: http://dx.doi.org/10.4103/jcecho.jcecho_45_20

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Accessed July 4, 2024 2:44 AM EDT
Utilization of the Transgastric View of the Left Atrial Appendage for Procedural Guidance during Left Atrial Appendage Clip Via Video-assisted Thoracoscopic Surgery

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Abstract

Left atrial appendage (LAA) ligation is a procedure that isolates the LAA and can decrease the risk of thrombus and arrhythmias in patients with atrial fibrillation, allowing patients to come off home anticoagulation medications. This procedure can be done through minimally invasive thoracoscopic surgery and requires guidance by transesophageal echocardiography. Visualization of the LAA and associated intrathoracic structures is vital for the success of the procedure. This echo rounds report describes an under-utilized method for LAA assessment to encourage cardiac anesthesiologists to consider employing it to increase their ability to completely evaluate the LAA.

Keywords: Interventional echocardiography, intraoperative echocardiography, left atrial appendage occlusion, transgastric left atrial appendage views

INTRODUCTION

A 54-year-old female with paroxysmal atrial fibrillation (AF) on oral anticoagulation presented for evaluation after suffering multiple subconjunctival hemorrhages. Given this inability to tolerate anticoagulation, left atrial appendage (LAA) occlusion was recommended to prevent the formation of thrombus and subsequent stroke. She was brought to the operating room for LAA ligation through video-assisted thoracoscopic surgery. Echocardiography was essential for LAA assessment and confirmation of correct device deployment.

CASE REPORT

Her baseline transesophageal echo (TEE) revealed normal biventricular function with mild left ventricular hypertrophy and no evidence of valvular disease. The left atrium was enlarged, measuring >6 cm in the anterior to posterior dimension, along with marked bowing of the interatrial septum into the right atrium. The transmitral pulse wave Doppler pattern revealed E/A ratio >2 and reduced standard deviation ratio on pulmonary venous Doppler consistent with high left atrial pressure. Lateral mitral annular tissue Doppler velocity was 9.1 cm/s, and the E/e’ ratio was calculated to be 9.5, consistent with intermediate left ventricular filling pressures. The LAA was interrogated with the midesophageal views at approximately omni-plane between 90° and 95°, utilizing zoom, x plane, and live 3D [Supplemental Video 1]. There was no evidence of thrombus; however, visualization of the appendage was at times difficult. The author attempted less utilized views for better assessment of the appendage, and was able to obtain superior views from a modified transgastric long axis [Figure 1 and Supplemental Video 2]. This view was obtained by advancing the probe into the stomach, using ante-flexion and then omni-plane to angle approximately 90° along with rotation of the probe in a counter-clockwise direction.

Division of the pericardium and externalization of the LAA was accomplished via video-assisted thoracoscopy aided...
by single lung ventilation. A 45 mm AtriClip® (AtriCure; Mason, OH) was passed through the base of the appendage and deployed. The exclusion of the LAA was confirmed by the absence of flow on color Doppler and the appearance of a sealed base of the LAA. Echocardiography was pivotal as it allowed demonstration of occlusion in real-time, confirming the successful deployment of the clip [Figure 2]. The incisions were closed, followed by smooth emergence from anesthesia, extubation, and an uneventful overnight hospital course. She was discharged home on the postoperative day 2, and has remained off anticoagulation with no further complications.

**Discussion**

AF has a population prevalence of about 2% and has been shown to have continually increasing incidence and prevalence.[1] AF is an independent risk factor for ischemic stroke and thromboembolic events, with about 20% of all ischemic strokes being associated with AF.[2] Oral anticoagulants are the standard for the prevention of ischemic stroke in AF; however, anticoagulation carries its own risk of major bleeding.

Evidence suggests that in patients with nonvalvular AF, >90% of thrombi originate in the LAA.[3] The effectiveness of LAA occlusion on stroke reduction has become well established with multiple studies demonstrating reduction of cardioembolic risk with LAA occlusion.[4] In patients with AF and contraindications for long-term anticoagulation, LAA occlusion has emerged as an attractive management option.

The Atriclip was demonstrated in a multicenter trial to be safe for LAA occlusion during open cardiac surgery.[5] Minimally invasive LAA ligation through video-assisted thoracoscopy has been gaining popularity as cardiopulmonary bypass is not required and sternotomy can be avoided in favor of smaller incisions. Discontinuation of oral anticoagulants is the main motivator for the procedure, though it also may reduce the recurrence of AF.[6] Complications with LAA ligation include those resulting from incomplete seal from either device malposition or dislodgment as well as surgical complications such as tearing or damage to the LAA or other structures.

Intraoperative TEE plays a pivotal role in LAA occlusion procedures for establishing the appendage is free of thrombus and assessing for any potential concerns that may impact anesthetic and surgical management. Deployment of the clip should be visualized in real-time, and assessment to determine the adequacy of compression and exclusion of the appendage are then undertaken. TEE is useful for the assessment of the left circumflex artery and its myocardial territory for evidence of damage of occlusion of flow. TEE is also vital for ruling out damage to other structures, tamponade, or bleeding into the thorax. With suboptimal mid-esophageal views due to abnormal myocardial axis, atrial anatomy, or prosthetic mitral or aortic valves, utilizing an alternate approach to imaging the LAA as was done in this case could be invaluable to the success of the procedure.

The traditional view of the LAA is from the ME views with an 80°–120° view.[7] It is reasonable to assume that pathology could be missed in the setting of suboptimal mid-esophageal views, and adding additional views could increase the quality of the interrogation. Although transgastric views of the LAA may not always be obtainable, adding it to the examination sequence deserves consideration. As we increasingly move toward noninvasive and echo guided procedures, thinking creatively about how to best image the cardiac structures may allow echocardiographers to retain the value of TEE even in suboptimal imaging settings.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

**Financial support and sponsorship**

Nil.
Conflicts of interest

There are no conflicts of interest.

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