Background: Structural variations in left atrial appendage (LAA) ostial morphology can contribute to incomplete closure of the LAA and peri-device leak (PDL) after LAA closure (LAAC). Prior data suggests that there is an increased residual risk of thromboembolism in patients with PDL after LAAC. However, there is a paucity of information on the interpretation of imaging data to risk stratify patients with PDL.

Purpose: We evaluated echocardiographic characteristics on post-LAAC imaging, and their association with residual risk of thromboembolism.

Methods: We analyzed data from follow up imaging with transesophageal echocardiograms (TEEs) which were performed at ≈1-year follow up after the LAAC with either the Watchman or Watchman-FLX device (Boston Scientific Inc). The images were reviewed in a blinded manner with regard to thromboembolic events after LAAC. In our analyses, we further classified the TEE images into 3 categories: 1) no leak, and completely thrombosed distal LAA, 2) no leak, but echolucent distal LAA (indicative of some residual, but undetectable, connection), or 3) presence of leak and echolucent distal LAA (Figure 1).

Results:

A total of 650 patients underwent LAAC at our center between 3/2015 and 12/2021: age 75.8±8.9 years, 64% male, and CHA2DS2-VASc 4.2±1.4. TEE imaging data (performed at 1-year or later after LAAC) was available for review in 460 patients. In 238 of 460 patients (51.7%) there was no leak and the LAA was completely thrombosed (Cohort 1). In 83 of 460 (18%) patients there no detectable leak but the LAA was echolucent (Cohort 2), and in 139 of 460 (30.2%) patients there was a discernible leak and the LAA was echolucent (Cohort 3). In this subset of 460 patients, there were 29 (3.2% per year) thromboembolic events (stroke or transient ischemic attack) over 2.0±0.2 years of follow-up; of these, only 3 (0.6% per year) strokes were disabling, and none were fatal. The median NIH stroke scale in patients with stroke/TIA was 2 (range 0-14; NIHSS < 5 is considered mild to moderate severity).

During follow-up (2.0±0.2 years), the incidence of thromboembolism was highest in Cohort 3 (7.5% per year) in comparison to Cohort 2 (3.1% per year) and Cohort 1 (0.84% per year) (Figure 2). Upon analysis with 2 separate multivariable models, the risk of thromboembolism was highest in Cohort 3 vs Cohort 1 (adjusted OR 10.0, 95% CI: 3.3-30.0; p < 0.001) after adjusting for age, gender, CHA2DS2-VASc and LVEF. In contrast, when comparing Cohort 2 vs Cohort 1 in a multivariable model, the difference in thromboembolic risk was an adjusted OR 3.4 (95% CI: 0. 9-13.1; p = 0.07).

Conclusions: The presence of PDL after LAAC is not uncommon and confers a significant residual thromboembolic risk in patients with AF. TEE imaging characteristics aid in risk stratification of patients with PDL, and may help guide management decisions such as leak closure or resumption/continuation of anticoagulation to mitigate stroke risk.

Figure 1: Classification based on review

No leak, full thrombosis of LAA Cohort 1

No leak, Echolucent LAA Cohort 2

Leak and Echolucent LAA Cohort 3