Methods: From a database of 18,003 cardiomyopathy patients treated at a tertiary care center between 2011 and 2017, 389 (2.2%) were admitted to the hospital with CA and constituted our study cohort.

Results: Of the 389 cardiomyopathy patients admitted with CA, 362 (93%) had documented rhythm: MVT 29, PVT 29, Unspecified VT 27, VF 145, PEA 69, Asystole 40, and unspecified bradyarrhythmia 23. Compared to patients with bradyarrhythmia, those with tachyarrhythmia were less frequently men (31% vs 56%, p = 0.027), and more likely to have electrolyte abnormalities (27% vs 5%, p < 0.001), new cardiac ischemia (29% vs 10%, p < 0.001), frequent PVCs (12% vs 0%, p = 0.001), be prescribed new anti-arrhythmic drugs (74% vs 24%, p < 0.001), be implanted with a new defibrillator during the index hospitalization (35% vs 4%, p < 0.001), but similar rates of utilization of advanced heart failure options (48% vs 50%, p = 0.03). Over a median follow-up of 2.8 years, patients with shockable rhythms had better survival (HR = 1.49, p = 0.002, Figure).

Conclusion: In the context of cardiomyopathy, a minority of patients are admitted with CA. Clinical characteristics, treatment options vary significantly between patients with shockable vs non-shockable rhythms. The former group has a significantly lower mortality.

PO-640-02

PREVALENCE AND RISK FACTORS ASSOCIATED WITH DECOMPENSATED HEART FAILURE AFTER SUCCESSFUL ELECTIVE CARDIOVERSION FOR ATRIAL FIBRILLATION AND ATRIAL FLUTTER

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Background: Acute pulmonary edema following cardioversion (CV) of atrial fibrillation (AF) or atrial flutter (AFL) has been previously reported. Mechanisms including left atrial mechanical failure have been postulated, yet no studies to our knowledge have revealed the etiology and no predictive clinical biomarkers are available.

Objective: To determine the incidence of and risk factors for decompensated heart failure (HF) after successful AF and AFL CV.

Methods: Seven hundred fifty-five patients underwent successful elective CV at our institution from July 1, 2018 to May 20, 2019. Patients presenting in arrhythmias other than AF or AFL, as well as those who reverted within 30 days, were excluded. Medical records of the remaining patients were reviewed before and after CV.

Results: Of 755 cases reviewed, 451 were determined to meet inclusion criteria for our study. Thirty-three patients (7.3%) developed HF symptoms while maintaining sinus rhythm (SR) after successful CV. Symptoms were reported an average of 5.6 days following CV (range 0-17 days, SD 4.71). Eighteen of these 33 patients (54.5%) had post CV echocardiograms with an average ejection fraction of 54% (range 15-70%, SD 13.54). Univariate risk factors for development of HF included: increased BMI (32.7 vs 38.0, P < 0.001), increased PASP (34.2mmHg vs 43.6mmHg, P = 0.003), AAD use (33% vs 52%, P = 0.03), CPAP use (12% vs 24%, P = 0.05), hypertension (67% vs 85%, P = 0.03), pulmonary hypertension (5% vs 21%, P < 0.001), valve disease (17% vs 36%), P = 0.008), and prior HF hospitalization (23% vs 55%, P < 0.001). Following a multivariate stepwise logistic regression model, prior HF hospitalization (OR 3.83, 95% CI 1.79-8.23), BMI (OR 1.06, 95% CI 1.02-1.11), valve disease (OR 2.53, 95% CI 1.13-5.65), and AAD use (OR 2.00, 95% CI 0.94-4.28) remained significant risk factors.

Conclusion: From our large dataset of CV for AF or AFL, we found 7.3% of patients suffered HF despite maintenance of SR. A multivariate logistic regression model identified several clinical features and biomarkers as risk factors for HF post CV, including elevated BMI, valve disease, previous HF hospitalization, and prior AAD use. In our future work, we will expand this dataset to help antecedent identification of at risk persons to initiate preventative treatment strategies.

PO-640-03

ELECTROGRAPHIC FLOW ANGLE VARIABILITY ENABLES ATRIAL RHYTHM DISCRIMINATION

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Background: Electographic Flow (EGF) mapping visualizes global cardiac action potential flows in near real-time and is a novel method to assess a spectrum of atrial arrhythmias. EGF patterns can determine whether areas of conduction are stable in flow direction over time or show flow angle variability (FAV) suggesting disorganized electrical wavefront propagation. Atrial fibrillation (AF) is a complex arrhythmia that can be organized by ablation or medication making it difficult to discriminate from atrial flutters (AFL) and tachycardias (AT).

Objective: Evaluate ability of FAV to differentiate atrial arrhythmias based on EGF patterns and degree of organization of endocardial activation.

Methods: We analyzed 1 minute of unipolar electrograms recorded from 183 AF patients, who underwent mapping with a 64-pole basket catheter. FAV measure of average number of flow direction over time or show flow angle variability (FAV) as R-RC enables quantitative distinction between AF and organized rhythms of AFL/AT.

Results: In 3,030 recordings, FAV increased as ACL decreased (p < .001, R2 = 0.5), and R-RC decreased (p < .001, R2 = 0.35). FAV was significantly higher in AF (3.5 ± 1.0) than in AFL (1.5 ± 0.5), p<.001 in or in AT (2.0 ± 0.9), p<.001. Box plots show mean ACL does not differentiate any rhythm while mean R-RC enables quantitative distinction between AF and organized rhythms of AFL/AT.

Conclusion: Flow angle variability as an indicator of stability of electographic flow directionality over time shows significant
differences between varying atrial arrhythmias and may enhance the differentiation of these arrhythmia types.

**PO-640-04**

**LONG TERM IMAGING AND CLINICAL OUTCOMES OF SURGICAL LEFT ATRIAL APPENDAGE OCCLUSION WITH ATRIAL CLIP**

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**Background:** Surgical left atrial appendage occlusion (LAAO) with an atrial clip (Atricure) is frequently performed for stroke prophylaxis in patients with atrial fibrillation (AF).

**Objective:** To assess the rates of complete LAA closure with Atriclip in patients undergoing concomitant hybrid AF ablation and surgical LAA clipping.

**Methods:** We conducted a retrospective analysis of all patients with long standing persistent AF (LSPAF) that underwent hybrid convergent ablation (surgical ablation plus endocardial catheter ablation) and LAA clipping. Contrast enhanced cardiac CT (CCTA) was performed at 6 months following LAA clipping to assess for degree of complete closure and assessment of residual LAA stump. Outcomes of stroke/transient ischemic attack were assessed at 12 month follow up.

**Results:** A total of 43 patients underwent LAA clipping as a part of hybrid convergent AF ablation during the study period. Mean age of the cohort was 64.9±8.9 years and 62.8% were males. Mean LA size was 4.5±1.2 cm. Median size of Atriclip was 45mm (IQR-40-50). At 6 month follow up CT imaging, 20 patients (46.5%) had evidence of a residual LAA stump proximal to the LAA clip. Mean depth of residual stump was 3.95±5.98 mm. 5 out of 11 patients had a stump depth of >10 mm and 1 patient had a depth of 24 mm that required closure with an endocardial LAA occluder device. All patients were continued on oral anticoagulation. There were no stroke/TIA events at 12 month follow up.

**Conclusion:** Rate of residual stump following surgical LAA exclusion with Atriclip is approximately 50%. Careful follow up imaging for assessment of complete closure is needed prior to making oral anticoagulation decisions.

**PO-640-05**

**GLOBAL ELECTRICAL HETEROGENEITY AND CARDIAC MEMORY CHANGES DISTINGUISH ACUTE FROM CHRONIC LEFT BUNDLE BRANCH BLOCK**

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**Background:** Time-dependent electrical remodeling due to ventricular activation sequence changes (cardiac memory), measured as peak QRS/T ratio, has been used to differentiate acute and chronic LBBB. The association between cardiac memory and the spatial ventricular gradient (SVG), a measure of myocardial global electrical heterogeneity (GEH), is unknown.

**Objective:** Compare SVG to peak QRS/T ratio in distinguishing between acute and chronic LBBB.

**Methods:** Acute (immediately post procedure) and chronic LBBB in patients undergoing transcatheter aortic valve replacement (TAVR) were identified retrospectively using a hospital ECG database. Vectorcardiograms were constructed from 12-lead ECGs obtained after TAVR using the Kors transformation. The SVG vector was constructed from the area under the X, Y, and Z median QRST complexes. SVG vector components were compared jointly using the multivariate test on means. SVG X, Y, and Z components as well as SVG vector magnitude and elevation were compared individually using t-tests. SVG azimuth was compared using the Wheeler-Watson-Mardia test for circular data. A receiver operator characteristic (ROC) curve was constructed for distinguishing acute from chronic LBBB using the SVG and peak QRS/T ratio.

**Results:** Among 31 post-TAVR patients with LBBB, n=21 had acute LBBB and n=10 had chronic LBBB. SVG vector orientation was significantly different among acute and chronic LBBB (joint p=0.004), primarily due to acute LBBB having more inferiorly and posteriorly directed SVG: the mean anterior-posterior (Z) component of the SVG (SVGz) was -10.8±25.0 vs. 37.8±27.3 mV*ms (p<0.0001) for acute and chronic LBBB patients, respectively. Similarly, mean SVG azimuth (angle in the frontal plane) was 18 vs -47 deg (p=0.004) for acute and chronic LBBB patients, respectively (Fig 1). SVGz was correlated with peak QRS/T ratio (Fig 2). The ROC area under the curve (AUC) was 0.91 for SVGz comparing new vs old LBBB. The ROC AUC for peak QRS/T ratio was similar at 0.94 (p=0.50 vs SVGz). SVGz > 3.2 mV*ms had a 90% sensitivity and 91% specificity for identifying chronic LBBB.

**Conclusion:** The SVG can distinguish acute from chronic LBBB and is correlated with measures of cardiac memory. The association between GEH and cardiac memory requires further study.