

($p=0.041$) compared to stable patients. Additionally, the former were more likely to have been admitted for AHF with no identifiable precipitant factor compared to the latter (60.0 vs 32.6%; $p=0.015$). Over a median follow-up of 19.5 (IQR: 9.4-29.0) months, 68 (32.2%) patients died and 87 (41.2%) had at least one HF hospitalization. In multivariate analysis adjusted for age, estimated glomerular filtration rate and NT-proBNP, day-hospital decompensation remained predictive of the primary endpoint (HR: 1.81; CI: 1.05-3.13; $p=0.033$), mostly due to increased risk of HF hospitalization (HR: 1.87; CI: 1.01-3.46; $p=0.046$).

Conclusions: Recurrent congestion after AHF in our HF management program is a significant event in the vulnerable phase, and it was an independent predictor of major outcomes. These results further unveil the pervasiveness and prognostic value of recurrent congestion despite assertive measures to optimize outpatient diuretic treatment.

Acute Heart Failure – Diagnostic Methods

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Left ventricular global longitudinal strain and free wall strain of the right ventricle in respect to sex and systolic function among patients with acutely decompensated heart failure

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On behalf of: CATSTAT-HF

Background: Heart failure (HF) is currently classified according to left ventricular ejection fraction (LVEF) in three distinct phenotypes whereas novel indices of cardiac function such as global longitudinal strain of the left ventricle (LV GLS) and 2D free wall strain of the right ventricle (2D RV FWS) have shown to provide an additional prognostic value in this population. We aimed to determine the proportion of acutely decompensated heart failure (ADHF) patients that had abnormal LV GLS and 2D RV FWS at index admission and to examine if these indices differ significantly among three HF phenotypes and between men and women.

Methods: A total of 42 consecutive patients with ADHF as adjudicated per ESC 2016 heart failure guidelines were enrolled at our university hospital. LVEF, LV GLS, and 2D RV FWS were measured by the same cardiologist with high expertise in echocardiography and an average of three consecutive measurements was chosen as the final value. Abnormal LV GLS was defined as a value $<17\%$ and, among those with abnormal LV GLS, values <17 but $>13\%$ were considered as mildly reduced, >8 to 12.9% as moderately reduced and $\leq 8\%$ as severely reduced LV GLS. Abnormal 2D RV FWS was defined as a value $<23\%$.

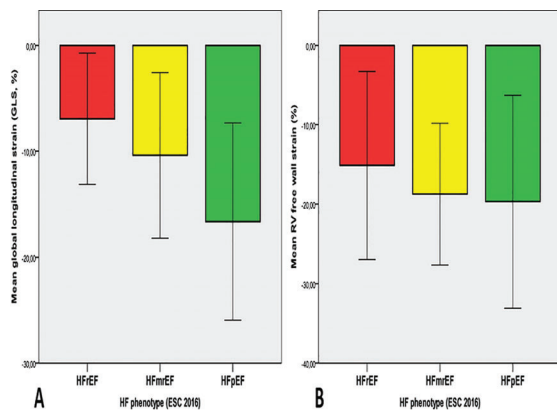


Figure 1

Results: Patients were on average 67.7 ± 11.8 years of age with mean LVEF of $39.1 \pm 15.9\%$ while both sexes were equally represented (21 women and 21 men). A total of 83.3% (N=35) of patients had abnormal LV GLS whereas 81% (N=34) of patients had abnormal 2D RV FWS. Nearly half of patients had severely reduced strain (47.6%, N=20) with about one-quarter having moderately reduced strain (26.2%, N=11). LV GLS was mildly reduced in 9.5% (N=4) of patients while only 16.7% of patients (N=7) had normal strain values. Mean LV GLS values significantly differed in respect to HF phenotypes ($p<0.001$) with the following values: 6.93 ± 3.10 , 10.38 ± 3.90 and $16.63 \pm 4.65\%$ among patients with LVEF $<40\%$, LVEF 40-49%, and $\geq 50\%$, respectively (Figure 1A). On another hand, mean 2D RV FWS values did not significantly differ among HF phenotypes ($p=0.142$) with the following values: 15.11 ± 5.91 , 18.73 ± 4.45 , and $19.68 \pm 6.69\%$ among patients with LVEF $<40\%$, LVEF 40-49% and $\geq 50\%$, respectively (Figure 1B). Finally, LV GLS values did not significantly differ between men and women (9.78 ± 5.88 vs. $10.48 \pm 5.18\%$,

respectively) whereas women had significantly higher 2D RV FWS values compared to men (19.53 ± 6.11 vs. $14.04 \pm 4.82\%$, $p=0.007$).

Conclusions: A vast majority of ADHF patients have significantly reduced strains of both left and right ventricle and it seems that these functions worsen according to the LV systolic function. Men seem to have a significantly worse strain of RV compared to women while no such differences were observed in terms of LV GLS. This difference might reflect different pathophysiology and etiology of HF in men compared to women, however, this would require elucidation in further studies.

Acute Heart Failure: Biomarkers

P255

Non-ischemic myocardial injury in heart failure is significantly associated with a higher symptomatic burden and higher circulating levels of ssT2, inflammation mediators and natriuretic peptides

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On behalf of: CATSTAT-HF

Background: Myocardial injury (MI) defined as an elevation of cardiac troponins beyond a certain threshold is frequently encountered during the acute worsening of heart failure (AWHF) and is associated with an adverse prognosis. The MI has many potential causes other than myocardial ischemia and underlying etiology must be carefully investigated. In this study, we aimed to assess whether the symptomatic burden of the disease as assessed with the New York Heart Association (NYHA) classification will differ between AWHF patients with and without MI of non-ischemic etiology. Furthermore, we sought to assess potential difference between those two groups in terms of circulating levels of soluble suppressor of tumorigenicity 2 (ssT2) reflecting adverse myocardial remodeling under stressed conditions and biomarkers reflecting inflammatory response (C-reactive protein, CRP and neutrophil-to-lymphocyte ratio, NLR) and ventricular overload (N-terminal pro b-type natriuretic peptide, NT-proBNP).

Methods: A total of 85 consecutive patients with AWHF, NYHA class II-IV, and without acute coronary syndrome (ACS) as an underlying cause of hospitalization were examined at our Cardiology Department. ACS was ruled out in all patients based on serial 12-lead electrocardiography tracings, clinical evaluation of symptoms/medical history and/or by diagnostic coronary angiography. All patients had their peripheral blood sampled within 24 hours of index hospitalization. The MI was defined as an elevation of high-sensitivity cardiac troponin I (hs-cTnI) beyond the upper limit of the 99th percentile, adjusted for sex, as following: >34.2 ng/L for men and >15.6 ng/L for women. All variables had normal distribution.

Results: Patients were on average 71.7 ± 9.1 years old, with predominance of women (51.8%) and with a mean left ventricular ejection fraction (LVEF) of $44.1 \pm 16.8\%$. Most of the patients had reduced LVEF (43.5%), followed by preserved LVEF (38.8%) while 17.6% of patients had midrange LVEF. The mean hs-cTnI value was 68.9 ± 101 ng/L. Slightly less than half of the patients (48.2%, N=41) had a myocardial injury with a mean hs-cTnI value of 132 ± 108 ng/L, while 51.8% (N=44) of patients did not have a myocardial injury with mean hs-cTnI value of 14 ± 8 ng/L. Both compared groups did not differ significantly in terms of age ($p=0.952$), body mass index ($p=0.947$) and estimated glomerular filtration rate ($p=0.288$). Patients with AWHF and with myocardial injury, compared to those without, had significantly higher NYHA class (3.2 vs. 2.8, $p=0.017$) and higher levels of circulating ssT2 (62.1 ± 45.2 vs. 40.2 ± 32.5 ng/mL, $p=0.018$), CRP (26.9 ± 29.6 vs. 11.4 ± 14.0 mg/L, $p=0.002$), NLR (5.6 ± 3.6 vs. 3.7 ± 2.2 , $p=0.005$) and NT-proBNP (9763 ± 10319 vs. 4825 ± 7821 pg/mL, $p=0.023$) (Figure 1).

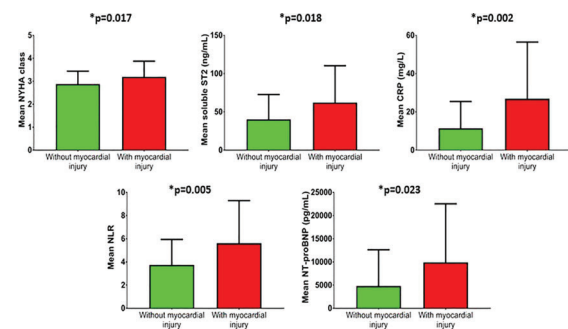


Figure 1

Conclusion: A presence of non-ischemic MI in AWHF is significantly associated with a higher symptomatic burden and an increase in adverse laboratory biomarkers that are historically associated with poor prognosis.

P256

Determinants of plasma antigen carbohydrate 125 and NT-proBNP concentrations in acute heart failure

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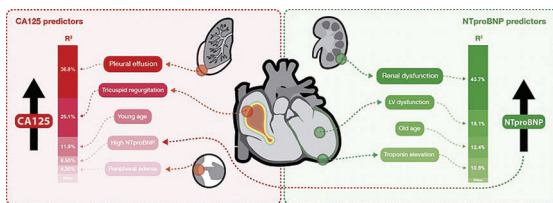
Background: Plasma amino-terminal pro-brain natriuretic peptide (NT-proBNP) and antigen carbohydrate 125 (CA125) have shown to be up-regulated in acute heart failure (HF) and their levels are positively associated with a higher risk of adverse clinical outcomes in acute HF. As a proxy of congestion, CA125 has also been proposed as a right-sided HF marker.

Purpose: We aimed to determine the independent predictors of CA125 and NT-proBNP and to quantify the contribution of echocardiographic HF measurements in their association.

Methods: We prospectively included 2949 patients admitted with acute HF. NT-proBNP and CA125 were used as dependent variables in a multivariable linear regression analysis.

Results: The mean age of the sample was 73.9±11.1 years, 1443 (48.9%) patients were female, 1358 (46.0%) were previously admitted for acute HF, and 1056 (35.8%) patients showed ischemic etiology. Regarding LVEF categories, 1521 (51.6%), 894 (30.3%) and 534 (18.1%) patients exhibited HF with preserved, reduced, and mid-range ejection fraction, respectively. The median (IQR) for NT-proBNP and CA125 were 4840 (2111-9204) pg/mL and 58 (26-129) U/mL, respectively. In a multivariable setting, and ranked in order of importance (R²), estimated glomerular filtration rate (43.7%), left ventricle ejection fraction (LVEF) (15.1%), age (12.4%), and high-sensitivity troponin T (10.9%) emerged as the most important determinants of NT-proBNP. The five main determinants of CA125 were, in order of importance: the presence of pleural effusion (36.8%), tricuspid regurgitation severity (25.1%), age (11.9%), NT-proBNP (6.5%), and peripheral edema (4.3%).

Conclusion: In patients with acute HF the main determinants of NT-proBNP were renal dysfunction, LVEF, and age. For CA125, clinical parameters of congestion and the severity of tricuspid regurgitation were the most important determinants. These results endorse the value of CA125 as a useful marker of right-sided HF.



Main determinants of CA125 and NT-proBNP

P258

Plasma volume status and its association with in-hospital and post-discharge outcomes in decompensated heart failure

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Background: Prior analyses have suggested an association between formula-based plasma volume (PV) estimates and clinical outcomes in heart failure (HF). We sought to assess the association between estimated PV-status by the Duarte-ePV and

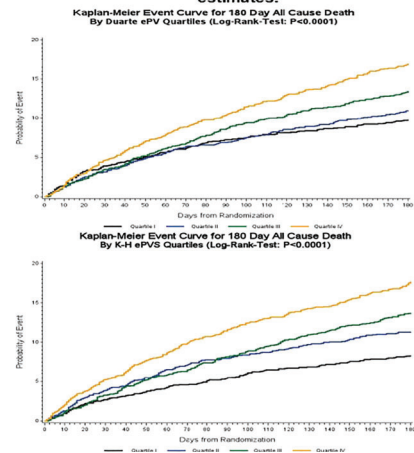
Kaplan Hakim (KH-ePVS) formulas, and in-hospital and post-discharge clinical outcomes, in a post-hoc analysis of ASCEND-HF.

Methods: KH-ePVS and Duarte-ePV were calculated on admission using a combination of weight, hematocrit and hemoglobin. We assessed associations with in-hospital worsening HF, 30-day composite cardiovascular mortality or HF rehospitalization and 180-day all-cause mortality.

Results: 6.373 (89.2%), and 6.354 (89.0%), patients had necessary baseline characteristics to calculate KH-ePVS and Duarte-ePV, respectively. Duarte-ePV and KH-ePVS were strongly correlated ($r=0.737$, $p<0.001$). There was no association between PV by either formula with in-hospital worsening HF and a weak correlation with measures of decongestion such as body weight change, urine output and NT-proBNP ($r<0.3$ for all). Duarte-ePV was associated with worse 30-day (adjusted OR 1.07, 95% CI 1.00-1.15, $p=0.049$), but not 180-day outcomes (adjusted HR 1.03, 95% CI 0.97-1.09, $p=0.289$). Continuous KH-ePVS >0 (per 10 unit increase) was associated with improved 30-day outcomes (adjusted OR 0.75, 95% CI 0.62-0.91, $p=0.004$). Continuous KH-ePVS was not associated with 180-day outcomes (adjusted HR 1.05, 95% CI 0.98-1.12, $p=0.139$). There was no interaction between LVEF = or $>40\%$ and PV, for 30-day or 180-day clinical outcomes ($p>0.05$).

Conclusions: Baseline PV estimates had a weak association with in-hospital measures of decongestion. Duarte-ePV, was associated with early clinical outcomes in decompensated HF, and may improve risk stratification in HF on hospital admission.

Kaplan-Meier Event Curves for 180 Day All-Cause Death by individual PV estimates.



Figure

P259

Early urinary sodium trajectory and risk of adverse outcomes in acute heart failure and renal dysfunction

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Background and objectives: In acute heart failure (AHF), urinary sodium (UNa⁺) has emerged as a useful biomarker for predicting poor clinical outcomes. Here, we sought to evaluate: 1) the utility of a single early determination of UNa⁺ for predicting adverse outcomes in patients with AHF and renal dysfunction (RD), and 2) whether changes in UNa⁺ at 24-h (Δ UNa_{24h}) adds any additional prognostic information over baseline values.

Methods: This is a post-hoc analysis of a multicenter, open-label, randomized clinical trial (IMPROVE-HF) in which 160 patients with AHF and RD on admission were randomized to a) standard diuretic strategy, or b) carbohydrate antigen 125-guided diuretic strategy. The main endpoint was all-cause mortality and total all-cause readmissions.

Results: The mean age was 78±8 years, and the mean glomerular filtration rate was 34.0±8.5 ml/min/1.73m². The median UNa⁺ was 90 mmol/L (65-111). At a median follow up of 1.73 years (IQR 0.48-2.35), 83 deaths (51.9%), 263 all-cause rehospitalizations in 110 patients were registered. UNa⁺ was independently associated to mortality (HR=0.75, IC 95%: 0.65-0.87; $p<0.001$), and all-cause rehospitalization