New-onset acute heart failure: Clinical profile and one-year outcomes. Observations from the OP-AHF Registry

Kacper Wójcicki[1], Helena Krysztofiak[2], Klaudia Dąbrowska[1], Damian Chruścicki[1], Krzysztof Nalewajko[2], Piotr Feusette[2], Marek Gierlotka[2], Joanna Płonka[2]

[1]Students' Research Group 'Cardios', Faculty of Medicine, University of Opole, Opole, Poland
[2]Department of Cardiology, University Hospital, Institute of Medical Sciences, University of Opole, Opole, Poland

Correspondence to:
Helena Krysztofiak, MD, Department of Cardiology, University Hospital in Opole, Witosa 26, 46–020 Opole, Poland, phone: +48 77 45 20 660, e-mail: helenakrysztofiak@gmail.com

DOI: 10.33963/v.kp.98444

Received:
July 6, 2023

Accepted:
December 7, 2023

Early publication date:
December 21, 2023

INTRODUCTION

Acute heart failure (AHF) can either be a first-time occurrence, referred to as new-onset (NO-AHF) or a deterioration of pre-existing heart failure (HF), known as acutely decompensated HF (ADHF) [1, 2]. AHF is responsible for the majority of unplanned hospital admissions among patients admitted to the Cardiology Department at the University Hospital in Opole [3]. Although they share certain characteristics, the two types of AHF differ in their pathophysiology, causes, and disease progression [2, 4]. NO-AHF is often caused by a sudden event or underlying cardiovascular disease that may have been asymptomatic. In contrast, ADHF is a pre-existing heart condition that worsens due to factors such as inflammation, arrhythmia, ischemia, non-optimal medical treatment, or lack of patients' adherence to prescribed therapy [2].

The purpose of the study was to compare the clinical characteristics of patients with NO-AHF and ADHF and evaluate 12-month prognosis in both groups.

METHODS

As part of the prospective Opole Registry of Acute Heart Failure (OP-AHF), data from 122 patients hospitalized in the Intensive Cardiac Care Unit between May 2019 and January 2021 were prospectively recorded. The inclusion criteria were hospitalization for AHF and the use of at least one of the following: intravenous diuretics, pressor amines, and/or mechanical circulatory support. The only exclusion criterion was lack of patient consent.

From the analyzed population, two groups were selected: patients with a history of HF admitted to the hospital due to worsening heart failure (66 [54%]) — ADHF, and patients without underlying chronic heart failure, admitted because of the first episode of AHF (56 [46%]) — NO-AHF. Of these 122 patients, 25 had acute coronary syndrome (ACS) diagnosed as the cause of AHF and were excluded from further analyses. Finally, the NO-AHF group comprised 39 and the ADHF group 58 patients. The registry data covered the in-hospital period and 12-month follow-up after discharge available for all patients. All information about deaths was obtained from hospital reports or, in the case of deaths outside the hospital, from the patients' families by telephone contact. The study was conducted in accordance with the Declaration of Helsinki and accepted by the Ethics Committee of the University of Opole.

Statistical analysis

Categorical variables were presented as percentages while continuous variables as mean values with standard deviation or medians with interquartile ranges based on data distribution and compared using the chi-square test with Yates's correction when necessary, and Student's t-test (for independent or dependent groups as appropriate) or Mann-Whitney U-test, respectively. Unadjusted and adjusted event-free survival was presented using Kaplan-Meier survival curves. Adjusted survival was calculated using the inverse probability weight method. Inverse probability weighting relies on building a logistic regression model to estimate the probability of exposure for a particular person and using the predicted probability as a weight in subsequent analyses. A *P*-value of less than 0.05 was considered significant.

All presented statistical analyses were performed using R software v.4.2.2 (the R Foundation for Statistical Computing, Vienna, Austria).

RESULTS AND DISCUSSION

After excluding ACS patients, there were 39 (40%) NO-AHF patients and 58 (60%) ADHF patients. Detailed characteristics of the analyzed groups are presented in Supplementary material, *Table S1*. Both groups were dominated by men; however, NO-AHF patients were younger. ADHF patients had statistically more often coexisting hypertension, chronic kidney disease, atrial fibrillation, and hypercholesterolemia, as well as past myocardial infarction and pre-hospitalization coronary revascularization or surgical intervention (CABG), which is similar to results shown in several meta-analyses [5, 6]. The dominant causes of AHF in NO-AHF patients were inflammation (28%), valvular diseases (15%), and tachyarrhythmia (13%), while in ADHF patients these were: coronary heart disease (41%), valvular diseases (21%), dilated cardiomyopathy (8.6%), and inflammation (8.6%). Studies have shown that about 13% of patients admitted to the emergency department with myocardial infarction develop AHF [7]. HF progression is largely related to excessive fluid accumulation caused by many factors [8]. Median hospitalization was similar in both groups (14 vs. 19 days; $P = 0.13$).

Shortness of breath occurred with a similar frequency in both groups on admission. Increasing edema appeared comparably in both groups (56% NO-AHF vs. 53% ADHF; $P = 0.77$), whereas chest pain occurred in 38% ADHF vs. 25% NO-AHF patients ($P = 0.21$) — both results were statistically irrelevant. Pulmonary edema was remarkably more often diagnosed in NO-AHF patients compared to ADHF (31% vs. 10%; $P = 0.01$).

In laboratory tests, NO-AHF patients were characterized by statistically important lower concentrations of creatinine and higher hemoglobin levels compared to ADHF patients. Among the selected echocardiographic parameters, mean left ventricular ejection fraction (LVEF) was similar in both groups (33% NO-AHF vs. 32.5% ADHF).

Catecholamines were used more often in the ADHF group, indicating a tendency toward their increased utilization in this patient population (13% NO-AHF vs. 28% ADHF; $P = 0.08$). The same is true for levosimendan (10% vs. 28%; $P = 0.04$). According to the European Society of Cardiology guidelines, levosimendan, as an alternative to dobutamine, can be mainly used in AHF (recommendation class IIb) [1]. However, taking into account its mechanisms of action [9], ongoing clinical trials assess the efficacy and safety of repetitive use of levosimendan in ambulatory patients with chronic HF with reduced ejection fraction [10].

Another option to support the cardiovascular system when pharmacological therapy has failed is mechanical circulatory support (MCS). According to the expert opinion of the Association of Intensive Cardiac Care and the Association of Cardiovascular Interventions of the Polish Cardiac Society, MCS can be used as a bridge to a decision, bridge to recovery, bridge to transplant, or sometimes as a destination therapy [11]. In the analyzed group, the intra-aortic balloon pump (IABP) was not frequently used in either group (3%). On discharge, New York Heart Association class II predominated in both groups (95% NO-AHF and 57% ADHF; $P < 0.001$). We did not observe any differences between the two groups depending on the type of medications that the patients used shortly before and after discharge; however, such differences have been described in several studies [13, 14].

After adjusting for age and sex, 12-month survival was significantly better in NO-AHF than ADHF (Figure 1A). NO-AHF patients were younger and less burdened with comorbidities compared to ADHF patients with a history of heart failure before the episode. This seems to have had an impact on better prognosis in the NO-AHF group. Prior diagnosis of HF was reported as an independent predictor of 5-year mortality [12]. Our study showed that NO-AHF patients have better both in-hospital and 12-month prognosis from the moment of admission to the hospital (Supplementary material, *Table S1*, and *Figure S3*) while outcomes from the day of discharge (Supplementary material, *Figures S1*, and *S2*) as well as when ACS patients were included (Supplementary material, *Figure S4*) were similar after adjustment for age and sex. Furthermore, in NO-AHF patients discharged from the hospital and surviving one year after the AHF episode, LVEF improved significantly (33% increased to 50.2%), while no such effect was observed in ADHF patients (32.5% raised to 37.2%) (Figure 1B).

AHF is a varied condition that needs complex treatment including all new available methods from pharmacotherapy to MCS [15]. NO-AHF seems to have better outcomes, however, our research was carried out with a limited number of AHF patients. Improvement of LVEF after discharge in NO-AHF patients could be at least in part responsible for their better prognosis.

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/kardiologia_polska.

Article information

Acknowledgments: This work was supported by the Institute of Medical Sciences, University of Opole (grant number: INM-2021-P-2020-029).

Conflict of interest: None declared.

Funding: None.

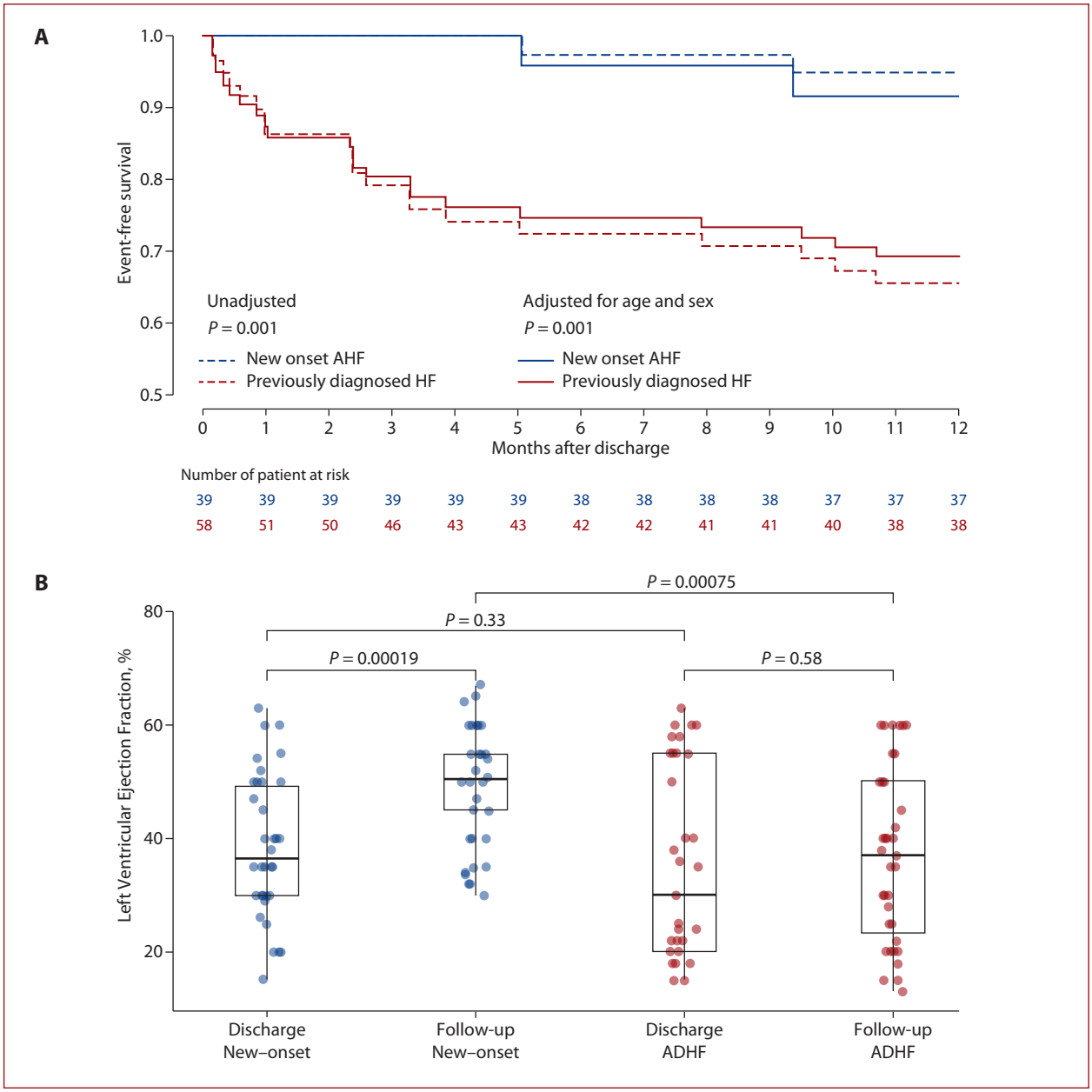

Figure 1. A. 12-month survival of patients with NO-AHF and ADHF (in-hospital deaths included). **B.** Boxplot presenting LVEF differences between discharge day and 12-month follow-up in NO-AHF and ADHF patients

Abbreviations: ADHF, acutely decompensated heart failure; LVEF, left ventricular ejection fraction; NO-AHF, new-onset acute heart failure

REFERENCES

1. McDonagh TA, Metra M, Adamo M, et al. 2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. Eur Heart J. 2021; 42(36): 3599–3726, doi: 10.1093/eurheartj/ehab368, indexed in Pubmed: 34447992.
2. Arrigo M, Jessup M, Mullens W, et al. Acute heart failure. Nature Reviews Disease Primers. 2020; 6(1), doi: 10.1038/s41572-020-0151-7.
3. Feusette P, Gierlotka M, Tukiendorf A, et al. Heart failure in Opole voivodeship — epidemiology and future perspectives [article in Polish]. Wiad Lek. 2019; 72(1): 112–119, indexed in Pubmed: 30796874.
4. Xanthopoulos A, Butler J, Parissis J, et al. Acutely decompensated versus acute heart failure: two different entities. Heart Fail Rev. 2020; 25(6): 907–916, doi: 10.1007/s10741-019-09894-y, indexed in Pubmed: 31802377.
5. Younis A, Mulla W, Goldkorn R, et al. Differences in mortality of new-onset (de-novo) acute heart failure versus acute decompensated chronic heart failure. Am J Cardiol. 2019; 124(4): 554–559, doi: 10.1016/j.amjcard.2019.05.031, indexed in Pubmed: 31221464.
6. Pranata R, Tondas AE, Yonas E, et al. Differences in clinical characteristics and outcome of de novo heart failure compared to acutely decompensated chronic heart failure - systematic review and meta-analysis. Acta Cardiol. 2021; 76(4): 410–420, doi: 10.1080/00015385.2020.1747178, indexed in Pubmed: 32252602.
7. Krzysztofik JM, Sokolski M, Kosowski M, et al. Acute heart failure in patients admitted to the emergency department with acute myocardial infarction. Kardiol Pol. 2017; 75(4): 306–315, doi: 10.5603/KP.a2016.0178, indexed in Pubmed: 27995597.
8. Miller WL. Fluid volume overload and congestion in heart failure. Circulation: Heart Failure. 2016; 9(8), doi: 10.1161/circheartfailure.115.002922.
9. Tycińska A, Gierlotka M, Bugajski J, et al. Levosimendan in the treatment of patients with acute cardiac conditions: an expert opinion of the Association of Intensive Cardiac Care of the Polish Cardiac Society. Kardiol Pol. 2020; 78(7-8): 825–834, doi: 10.33963/KP.15551, indexed in Pubmed: 32788567.
10. Tycińska A, Gierlotka M, Bartuś S, et al. Repetitive use of LEvosimendan in Ambulatory Heart Failure patients (LEIA-HF) — The rationale and study

design. Adv Med Sci. 2022; 67(1): 18–22, doi: 10.1016/j.advms.2021.10.001, indexed in Pubmed: 34656873.
11. Tycińska A, Grygier M, Biegus J, et al. Mechanical circulatory support. An expert opinion of the Association of Intensive Cardiac Care and the Association of Cardiovascular Interventions of the Polish Cardiac Society. Kardiol Pol. 2021; 79(12): 1399–1410, doi: 10.33963/KP.a2021.0169, indexed in Pubmed: 34861044.
12. Lassus JPE, Siirilä-Waris K, Nieminen MS, et al. Long-term survival after hospitalization for acute heart failure — differences in prognosis of acutely decompensated chronic and new-onset acute heart failure. Int J Cardiol. 2013; 168(1): 458–462, doi: 10.1016/j.ijcard.2012.09.128, indexed in Pubmed: 23073273.
13. Książczyk M, Lelonek M. The efficacy and safety of predischarge initiation of angiotensin receptor/neprilysin inhibitor in patients with severe left ventricular dysfunction hospitalized for acute decompensated heart failure: Single-center experience. Kardiol Pol. 2023; 81(9): 913–915, doi: 10.33963/KP.a2023.0132, indexed in Pubmed: 37331020.
14. Gorczyca-Głowacka I, Mastalerz-Migas A, Lelonek M. Real-life implementation of guidelines for heart failure management. Kardiol Pol. 2023; 81(9): 919–921, doi: 10.33963/KP.a2023.0144, indexed in Pubmed: 37401578.
15. Lelonek M, Grabowski M, Kasprzak JD, et al. An expert opinion of the Heart Failure Association of the Polish Cardiac Society on the 2021 European Society of Cardiology guidelines for the diagnosis and treatment of acute and chronic heart failure: Heart failure guidelines from a national perspective. Kardiol Pol. 2022; 80(2): 239–246, doi: 10.33963/KP.a2022.0021, indexed in Pubmed: 35076082.