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CLINICAL RESEARCH

The Effect of Door-to-Diuretic Time on Clinical Outcomes in Patients With Acute Heart Failure

Jin Joo Park, MD,[a] Sun-Hwa Kim, PhD,[a] Il-Young Oh, MD,[a] Dong-Ju Choi, MD,[a] Hyun-Ah Park, MD,[b] Hyun-Jai Cho, MD,[c] Hae-Young Lee, MD,[c] Jae-Yeong Cho, MD,[d] Kye Hun Kim, MD,[d] Jung-Woo Son, MD,[e] Byung-Su Yoo, MD,[e] Jaewon Oh, MD,[f] Seok-Min Kang, MD,[f] Sang Hong Baek, MD,[g] Ga Yeon Lee, MD,[h] Jin Oh Choi, MD,[h] Eun-Seok Jeon, MD,[h] Sang Eun Lee, MD,[i] Jae-Joong Kim, MD,[i] Ju-Hee Lee, MD,[j] Myeong-Chan Cho, MD,[j] Se Yong Jang, MD,[k] Shung Chull Chae, MD,[k] Byung-Hee Oh, MD[c]

ABSTRACT

OBJECTIVES This study sought to examine the impact of door-to-diuretic (D2D) time on mortality in patients with acute heart failure (AHF) who were presenting to an emergency department (ED).

BACKGROUND Most patients with AHF present with congestion. Early decongestion with diuretic agents could improve their clinical outcomes.

METHODS The Korea Acute Heart Failure registry enrolled 5,625 consecutive patients hospitalized for AHF. For this analysis, the study included patients who received intravenous diuretic agents within 24 h after ED arrival. Early and delayed groups were defined as D2D time ≤60 min and D2D time >60 min, respectively. The primary outcomes were in-hospital death and post-discharge death at 1 month and 1 year on the basis of D2D time.

RESULTS A total of 2,761 patients met the inclusion criteria. The median D2D time was 128 min (interquartile range: 63 to 243 min), and 663 (24%) patients belonged to the early group. The baseline characteristics were similar between the groups. The rate of in-hospital death did not differ between the groups (5.0% vs. 5.1%; $p > 0.999$), nor did the post-discharge 1-month (4.0% vs. 3.0%; log-rank $p = 0.246$) and 1-year (20.6% vs. 19.3%; log-rank $p = 0.458$) mortality rates. Get With the Guidelines-Heart Failure risk score was calculated for each patient. In multivariate analyses with adjustment for Get With the Guidelines-Heart Failure risk score and other significant clinical covariates and propensity-matched analyses, D2D time was not associated with clinical outcomes.

CONCLUSIONS The D2D time was not associated with clinical outcomes in a large prospective cohort of patients with AHF who were presenting to an ED. (Registry [Prospective Cohort] for Heart Failure in Korea [KorAHF]; NCT01389843) (J Am Coll Cardiol HF 2018;6:286–94) © 2018 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

From the [a]Cardiovascular Center, Division of Cardiology, Seoul National University Bundang Hospital, Seongnam, Republic of Korea; [b]Department of Family Medicine, Inje University Seoul Paik Hospital, Seoul, Republic of Korea; [c]Department of Internal Medicine, Seoul National University Hospital, Seoul, Republic of Korea; [d]Heart Research Center of Chonnam National University, Gwangju, Republic of Korea; [e]Yonsei University Wonju College of Medicine, Wonju, Republic of Korea; [f]Yonsei University College of Medicine, Seoul, Republic of Korea; [g]Department of Internal Medicine, the Catholic University of Korea, Seoul, Republic of Korea; [h]Department of Internal Medicine, Sungkyunkwan University College of Medicine, Seoul, Republic of Korea; [i]Division of Cardiology, Asan Medical Center, Seoul, Republic of Korea; [j]Chungbuk National University College of Medicine, Cheongju, Republic of Korea; and the [k]Kyungpook National University College of Medicine, Daegu, Republic of Korea. This work was supported by Research of Korea Centers for Disease Control and Prevention (grant nos. 2010-E63003-00, 2011-E63002-00, 2012-E63005-00, 2013-E63003-00, 2013-E63003-01, 2013-E63003-02, and 2016-ER6303-00) and by the SNUBH Research Fund (grant nos. 14-2015-029, 16-2017-003). All authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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Acute heart failure (AHF) is a life-threatening condition with high morbidity and mortality, which requires immediate medical intervention (1). Most patients with AHF present with signs and symptoms of congestion, but few present with symptoms of low cardiac output (2). Thus, early decongestion with diuretic agents is 1 of the cornerstones for the treatment for patients with AHF (1).

In patients with ST-segment elevation myocardial infarction (STEMI), the door-to-balloon time correlates with the extent of myocardial injury and patients' outcomes (3,4); accordingly, the current practice guideline recommends a door-to-balloon time of <90 min (5). Similarly, the concept of "time to therapy" has been introduced in patients with AHF, by emphasizing the rapid initiation of diagnosis and therapeutic intervention. Recently, Matsue et al. (6) reported that patients with AHF receiving intravenous loop diuretic agents within 60 min after emergency department (ED) arrival had lower in-hospital mortality rates.

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In contrast to patients with STEMI, where acute occlusion of a coronary artery and the following ischemia lead to irreversible myocardial injury within a short time period ("time is myocardium"), AHF is a "subacute" process with a remote trigger and successive decompensation leading to hemodynamic and clinical congestion. Considering the reversibility of congestion and the relatively long time period between the trigger and full-blown AHF, the door-to-diuretic (D2D) time may have limited clinical impact on clinical outcomes.

In this study, we sought to examine the effect of D2D time on the in-hospital and post-discharge clinical outcomes in a large, prospective cohort of patients with AHF presenting to an ED.

ABBREVIATIONS AND ACRONYMS

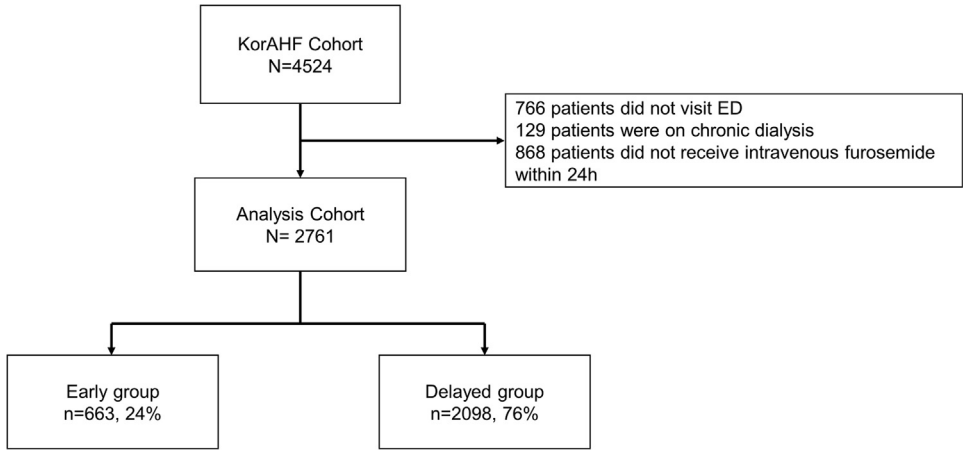
AHF = acute heart failure
D2D = door-to-diuretic
ED = emergency department
EF = ejection fraction
GWTG-HF = Get With the Guidelines-Heart Failure
HF = heart failure
NYHA = New York Heart Association
STEMI = ST-segment elevation myocardial infarction

METHODS

PATIENTS. The Korea Acute Heart Failure (KorAHF) registry was a prospective, multicenter cohort study that consecutively enrolled 5,625 patients hospitalized for AHF syndrome from 10 well-known tertiary university hospitals throughout Korea between March 2011 and December 2014 (NCT01389843). Detailed information on the study design and its results have been previously reported (7,8). Patients with signs or symptoms of heart failure (HF) and lung congestion, objective findings of left ventricular systolic dysfunction, or structural heart disease were eligible for the study. All patients were scheduled for follow-up at least 3 years after the index hospitalization. The mortality data for patients who were lost to follow-up were collected from the National Insurance data or National Death Records.

In this study, we included only patients who were admitted to an ED and received intravenous furosemide within 24 h after ED arrival. Patients who received the first dose of furosemide 24 h after ED arrival were excluded because they may have received

FIGURE 1 Study Population



ED = emergency department; KorAHF = Korea Acute Heart Failure.