Prognostic impact of heart failure phenotype on survival after endovascular therapy for peripheral artery disease: insights from the multicenter retrospective SETers study

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ABSTRACT

Objective: Peripheral artery disease (PAD) is frequently complicated by heart failure (HF), yet the prognostic impact of HF and its phenotypes in patients undergoing endovascular therapy (EVT) remains poorly defined. This study evaluated the 3-year mortality associated with HF and compared outcomes between HF with preserved ejection fraction (HFpEF) and HF with reduced ejection fraction (HFrEF).

Methods: This multicenter, retrospective study included 1585 patients who underwent EVT for symptomatic PAD between 2018 and 2020. Patients were stratified into non-HF (n = 946) and HF (n = 639) groups; HF was further categorized into HFpEF (EF ≥50%) and HFrEF (EF <40%). The primary outcome was all-cause mortality at 3 years.

Results: During the 3-year follow-up, all-cause mortality was significantly higher in patients with HF than in those without HF (26.8% vs 8.1%; log-rank $P < .001$). In the overall population, HFrEF was independently associated with increased mortality compared with non-HF patients (adjusted hazard ratio, 2.07; 95% confidence interval, 1.13-3.76; $P = .017$), whereas HFpEF was not. Among patients with HF, HFrEF was associated with higher mortality than HFpEF (38.5% vs 22.8%; $P = .009$), and this remained significant after multivariable adjustment (adjusted hazard ratio, 1.81; 95% confidence interval, 1.16-2.82; $P = .009$). In multivariable analysis, age ≥75 years, chronic limb-threatening ischemia, hemodialysis, serum albumin <3.0 g/dL, and HFrEF were independently associated with all-cause mortality.

Conclusions: HF phenotype provides important prognostic information in EVT-treated PAD patients. HFrEF was associated with the highest mortality risk, particularly in patients with chronic limb-threatening ischemia. (JVS-Vascular Insights 2026;4:100520.)

Keywords: Peripheral artery disease; Heart failure; Endovascular therapy; Chronic limb-threatening ischemia; Heart failure with reduced ejection fraction; Heart failure with preserved ejection fraction

Peripheral artery disease (PAD), a clinical manifestation of systemic atherosclerosis, is associated with a high risk of cardiovascular morbidity and mortality. Patients with PAD often have concomitant cardiovascular comorbidities, including heart failure (HF), because of shared risk factors, including hypertension, diabetes mellitus, and

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coronary artery disease.[1-5] The coexistence of PAD and HF reflects a greater atherosclerotic burden and is linked to worse survival outcomes.[6] Endovascular therapy (EVT) has become a cornerstone in the management of symptomatic lower extremity artery disease.[7-11] However, patients undergoing EVT frequently present with complex comorbid conditions, and HF may further worsen the procedural and long-term outcomes. Despite its clinical importance, data on the prognostic impact of HF in PAD patients treated with EVT remain limited.[12] Moreover, HF is a heterogeneous syndrome, encompassing HF with reduced ejection fraction (HFrEF) and HF with preserved ejection fraction (HFpEF).[13,14] These phenotypes differ in terms of pathophysiology, treatment response, and prognosis, yet their comparative impact in patients with PAD receiving EVT remains largely unexplored. Therefore, the present study aimed to investigate the effect of HF on 3-year mortality in patients with PAD undergoing EVT and to compare the prognostic differences between HFpEF and HFrEF. Clarifying these associations may improve prognostic assessment in patients undergoing EVT for symptomatic PAD.

ARTICLE HIGHLIGHTS

- **Type of Research:** Multicenter, retrospective cohort study
- **Key Findings:** Among 1585 patients undergoing endovascular therapy for symptomatic peripheral artery disease, 3-year mortality was higher in patients with heart failure (HF) than in those without HF (26.8% vs 8.1%; $P < .001$). Among patients with HF, HF with reduced ejection fraction was independently associated with increased mortality compared with HF with preserved ejection fraction (adjusted hazard ratio, 1.81; 95% confidence interval, 1.16-2.82; $P = .009$).
- **Take Home Message:** HF phenotype provides important prognostic information after endovascular therapy. Patients with chronic limb-threatening ischemia and HF with reduced ejection fraction represent an ultra-high-risk subgroup and may require intensified cardiovascular risk management after revascularization.

METHODS

Study population and design. SETers (retrospective study of prognosis and various factors in the EVT performed on patients with symptomatic lower extremity artery disease) is a multicenter, retrospective study involving 13 institutions. We retrospectively enrolled 1685 consecutive patients who underwent EVT for symptomatic lower extremity arterial disease (Rutherford categories 2-6) between January 2018 and December 2020. The study flow chart is shown in Fig 1.

Patients with missing left ventricular ejection fraction (LVEF) data were excluded. After applying this exclusion criterion, 1585 patients were included in the final analysis. The study was approved by the institutional review board of Kurashiki Central Hospital (reference no. 4622).

Definition of HF phenotype and subgroups. A history of HF was determined based on a prior documented clinical diagnosis in medical records. For the purpose of this study, the HF definition was retrospectively aligned with the 2021 European Society of Cardiology guideline.[15] As supportive evidence, elevated natriuretic peptide (brain natriuretic peptide ≥100 pg/mL, N-terminal pro-brain natriuretic peptide ≥300 pg/mL) levels or an LVEF of <50% were considered indicative of HF. Patients were divided into the following three groups according to LVEF: non-HF group, comprising patients without a prior diagnosis of HF and with normal echocardiographic findings; HFpEF group, including patients with an LVEF of ≥50%; and HFrEF group, comprising patients with an LVEF of <40%. Patients with midrange LVEF (40%-49%) were excluded from the analysis of HF subtype to avoid an overlap.

EVT procedures. EVT was performed according to standard clinical practice at each participating hospital. The procedures included drug-coated balloon angioplasty and stent implantation, as determined by the treating physician. The antiplatelet drug administered was aspirin (100 mg/d) with clopidogrel (75 mg/d) and/or cilostazol (100 or 200 mg/d), and its treatment duration was dependent on the patient's background, lesion characteristics, and intervention results. For all patients, at least one antiplatelet drug was maintained after EVT.

Outcome measures. The primary outcome was all-cause mortality at 3 years after EVT. Follow-up information was obtained from hospital records and scheduled outpatient visits, and vital status was confirmed by telephone when necessary.

Statistical analysis. Continuous variables were expressed as means ± standard deviations and were compared using the Student *t*-test for normally distributed data or expressed as median values with interquartile ranges and compared using the Wilcoxon rank-sum test for non-normally distributed data. Categorical variables were presented as frequencies and percentages and compared using the χ^2 test or the Fisher exact test as appropriate. Survival was estimated using the Kaplan-Meier method and compared using the log-rank test.

Cox proportional hazards regression was used to evaluate the association between HF status and all-cause mortality in the overall population. In the overall

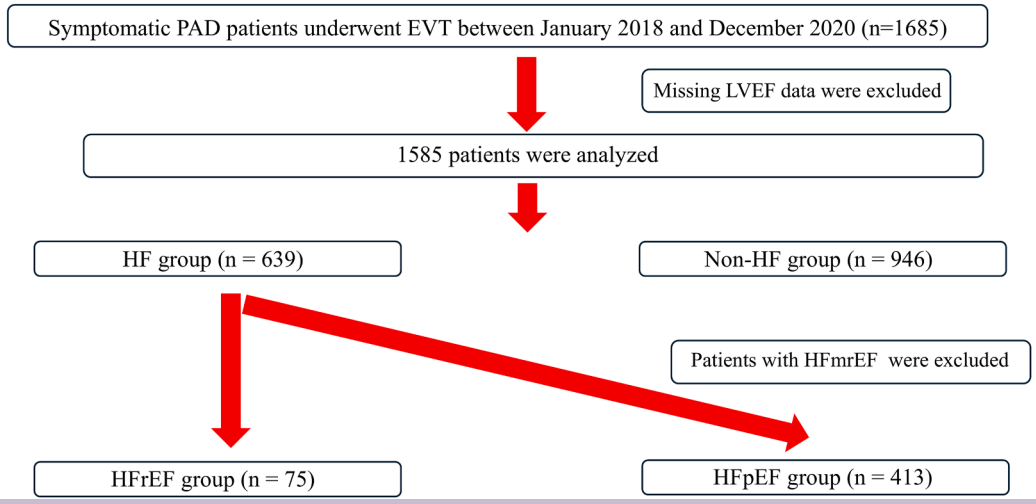

Fig 1. Flow diagram of patient selection for the study cohort. *EVT*, Endovascular therapy; *HF*, heart failure; *HFmrEF*, heart failure with mildly reduced ejection fraction; *HFpEF*, heart failure with preserved ejection fraction; *HFrEF*, heart failure with reduced ejection fraction; *LVEF*, left ventricular ejection fraction; *PAD*, peripheral artery disease.

population, HF phenotype was also examined using non-HF patients as the reference category. Multivariable models were adjusted for clinically relevant covariates based on prior literature and clinical judgment, including age >75 years, male sex, body mass index <18.5 kg/m^2, hypertension, chronic limb-threatening ischemia (CLTI), diabetes mellitus, atrial fibrillation or flutter, hemodialysis, serum albumin <3.0 g/dL, and use of anticoagulants, β-blockers, renin-angiotensin system inhibitors, and statins. Among patients with HF, Cox proportional hazards regression was performed to compare HFpEF and HFrEF. Because of the limited number of patients with HFrEF, the multivariable model was intentionally restricted to the HF phenotype (HFrEF vs HFpEF) and four established prognostic covariates (age ≥75 years, CLTI, hemodialysis, and serum albumin <3.0 g/dL) to minimize the risk of model overfitting. The results were expressed as adjusted hazard ratios (HRs) with associated 95% confidence intervals (CIs). A two-sided *P* value of <.05 was considered statistically significant. The proportional hazards assumption was verified using Schoenfeld residuals. Statistical analysis was performed using JMP (version 18.0; SAS Institute).

RESULTS

Baseline characteristics. The median follow-up duration was 1096 days (interquartile range, 789-1096 days). Of the 1585 patients included in the analysis, 639 (40.3%) had a history of HF. Baseline characteristics are summarized in Table I. Patients with HF were older and had a higher prevalence of diabetes mellitus, hemodialysis, coronary artery disease, atrial fibrillation or flutter, and CLTI compared with those without HF.

Primary outcome. During the 3-year follow-up, all-cause mortality was significantly higher in patients with HF than in those without HF (26.8% vs 8.1%; log-rank *P* < .001; Fig 2, *A*).

Table II shows the independent predictors of all-cause mortality. In the overall population, HFrEF was independently associated with increased mortality compared with non-HF patients (adjusted HR, 2.07; 95% CI, 1.13-3.76; *P* = .017), whereas HFpEF was not (adjusted HR, 1.04; 95% CI, 0.72-1.50; *P* = .82). Older age, CLTI, hemodialysis, low serum albumin level, and anticoagulant use were also independently associated with increased mortality.

Outcomes according to HF phenotype. Among the 639 patients with HF, 413 were classified as having HFpEF and 75 as having HFrEF (Table III). Patients with HFrEF were more likely to be male and had a higher prevalence of coronary artery disease. HFrEF was associated with significantly higher all-cause mortality compared with HFpEF (38.5% vs 22.8%; log-rank *P* = .009; Fig 2, *B*). This association remained significant after multivariable adjustment (adjusted HR, 1.81; 95% CI, 1.16-2.82; *P* = .009; Table IV). CLTI, age ≥75 years, hemodialysis, and low serum albumin levels (<3.0 g/dL) were also independently associated with increased mortality. During the 3-year follow-up, 230 patients died. Of these, 99 deaths (43.0%) were cardiac-related. Among patients with HF, cardiac death occurred significantly more frequently in patients with HFrEF than in those with HFpEF (18.7% vs 9.9%; *P* = .028). Infection-related death was also more common in patients with HFrEF (12.0% vs 5.6%; *P* = .038), whereas cancer-related and other causes of death were similar between the groups (Supplementary Table, online only).

Table I. The baseline patient characteristics

Characteristics	Overall population		
	Non-HF (n = 946)	HF (n = 639)	*P* value
Age, years	73.9 ± 8.6	75.4 ± 9.3	.001
Male	684 (72.3)	427 (66.8)	.017
BMI, kg/m^2	22.7 ± 3.5	22.2 ± 3.7	.017
Ambulation status			
Independent	868 (91.7)	506 (79.2)	<.001
Wheelchair bound	69 (7.3)	114 (17.8)	<.001
Bedbound	9 (1.0)	19 (3.0)	.001
Hypertension	770 (81.5)	539 (84.4)	.14
Hyperlipidemia	579 (61.2)	375 (58.7)	.31
Diabetes mellitus	482 (51.0)	397 (62.1)	<.001
Smoking history	604 (63.9)	370 (57.9)	.016
Hemodialysis	98 (10.4)	233 (36.5)	<.001
Cerebrovascular disease	165 (17.5)	144 (22.5)	.012
Coronary artery disease	335 (35.4)	374 (58.5)	<.001
Atrial fibrillation or flutter	86 (9.1)	199 (31.2)	<.001
LVEF	65.3 ± 6.5	55.3 ± 12.5	<.001
Serum albumin, g/dL	3.8 ± 0.5	3.6 ± 0.6	<.001
BNP, pg/mL	36.6 ± 24.3	340.4 ± 454.8	<.001
ABI	0.63 ± 0.21	0.59 ± 0.25	.002
CLTI	226 (23.9)	306 (47.9)	<.001
Rutherford category			
2	432 (45.7)	158 (24.7)	<.001
3	288 (30.4)	175 (27.4)	.19
4	59 (6.2)	63 (9.9)	.008
5	149 (15.8)	206 (32.2)	<.001
6	18 (1.9)	37 (5.8)	<.001
Aspirin	719 (76.0)	453 (70.9)	.022
P2Y12i	796 (84.1)	505 (79.0)	.01
Cilostazol	188 (19.9)	93 (14.6)	.006
Oral anticoagulant	88 (9.3)	175 (27.4)	<.001
β-Blocker	191 (20.2)	346 (54.2)	<.001
ACEi/ARB	499 (52.8)	311 (48.7)	.11
MRA	25 (2.6)	76 (11.9)	<.001
Statin	646 (68.3)	373 (58.4)	<.001

ABI, Ankle brachial index; *ACEi*, angiotensin-converting enzyme inhibitor; *ARB*, angiotensin II receptor blocker; *BMI*, body mass index; *BNP*, brain natriuretic peptide; *CLTI*, chronic limb-threatening ischemia; *HF*, heart failure; *LVEF*, left ventricular ejection fraction; *MRA*, mineralocorticoid receptor antagonist; *P2Y12i*, P2Y12 inhibitor.
Values are mean ± standard deviation or numbers (%), unless otherwise specified.

Subgroup analysis. Among the 639 patients with HF, 333 had intermittent claudication (IC), and 306 had CLTI. When stratified by disease severity, no significant difference in all-cause mortality between HFpEF and HFrEF was observed in patients with IC (14.3% vs 19.1%; log-rank $P = .60$; Fig 3). In contrast, among patients with CLTI, HFrEF was associated with markedly higher mortality compared with HFpEF (56.2% vs 32.4%; log-rank $P = .016$). This association remained significant after multivariable adjustment (adjusted HR, 1.92; 95% CI, 1.15-3.21; $P = .013$; Table V), indicating a particularly high-risk phenotype in patients with advanced PAD.

These findings identify patients with CLTI and HFrEF as an ultra-high-risk subgroup despite successful revascularization.

DISCUSSION

In this multicenter retrospective study of patients undergoing EVT for symptomatic PAD, HF was associated with substantially higher 3-year all-cause mortality.

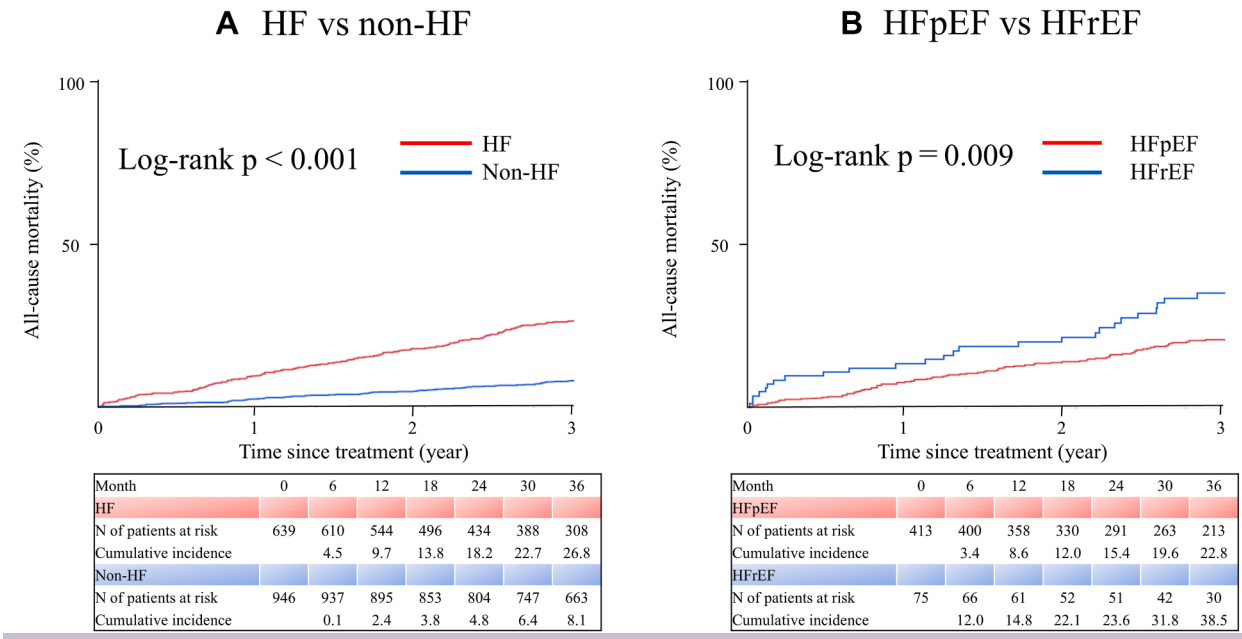

Fig 2. Kaplan-Meier curves for all-cause mortality after endovascular therapy according to heart failure status and phenotype. **A,** Kaplan-Meier curves for all-cause mortality according to HF status after EVT. **B,** Kaplan-Meier curves for all-cause mortality according to HF phenotype after EVT. *EVT*, Endovascular therapy; *HF*, heart failure; *HFpEF*, heart failure with preserved ejection fraction; *HFrEF*, heart failure with reduced ejection fraction.

Table II. The independent predictors of all-cause mortality

	Univariate		Multivariate	
Variable	Hazard ratio (95% CI)	*P* value	Hazard ratio (95% CI)	*P* value
Age >75 years	2.35 (1.76, 3.14)	<.001	2.62 (1.87, 3.67)	<.001
Male	1.04 (0.77, 1.42)	.78	–	–
BMI <18.5 kg/m^2	1.41 (0.95, 2.11)	.10	–	–
Hypertension	0.96 (0.67, 1.39)	.84	–	–
CLTI	5.49 (4.06, 7.42)	<.001	2.94 (2.09, 4.16)	<.001
HFpEF	1.92 (1.43, 2.58)	<.001	1.04 (0.72, 1.50)	.82
HFrEF	3.40 (2.06, 5.59)	<.001	2.07 (1.13, 3.76)	.017
Diabetes mellitus	1.47 (1.10, 1.97)	.008	1.14 (0.82, 1.60)	.41
Atrial fibrillation or flutter	2.20 (1.60, 3.02)	<.001	1.29 (0.85, 1.97)	.23
Hemodialysis	3.83 (2.85, 5.15)	<.001	3.13 (2.19, 4.49)	<.001
Serum albumin <3.0 g/dL	4.67 (3.17, 6.90)	<.001	2.26 (1.45, 3.52)	<.001
Anticoagulant	2.56 (1.86, 3.53)	<.001	1.92 (1.27, 2.90)	.002
β-Blocker	1.39 (1.04, 1.86)	.024	1.01 (0.72, 1.43)	.92
ACEi/ARB	0.60 (0.45, 0.80)	<.001	0.84 (0.61, 1.15)	.29
Statin	0.50 (0.38, 0.66)	.009	0.81 (0.58, 1.11)	.20

ACEi, Angiotensin-converting enzyme inhibitor; *ARB*, angiotensin II receptor blocker; *BMI*, body mass index; *CI*, confidence interval; *CLTI*, chronic limb-threatening ischemia; *HFpEF*, heart failure with preserved ejection fraction; *HFrEF*, heart failure with reduced ejection fraction.

Among HF phenotypes, HFrEF identified the highest-risk subgroup, whereas the independent prognostic impact of HFpEF was attenuated after adjustment for established risk factors. Notably, the excess risk associated with HFrEF was most evident among patients with CLTI. These findings suggest that HF phenotype, particularly reduced LVEF, may provide clinically relevant prognostic information beyond conventional PAD risk factors in patients undergoing EVT.

Previous studies have reported an adverse impact of HF on survival in patients with PAD.[16,17] However, most were conducted before the widespread adoption of

Table III. The baseline characteristics of the patients stratified by HF phenotype

Characteristics	Overall population		
	HFpEF (n = 413)	HFrEF (n = 75)	*P* value
Age, years	76.4 ± 8.9	73.9 ± 8.9	.024
Male	245 (59.3)	61 (81.3)	.012
BMI, kg/m^2	22.3 ± 3.7	22.2 ± 3.7	.91
Ambulation status			
Independent	322 (78.0)	61 (81.3)	.51
Wheelchair bound	77 (18.6)	12 (16.0)	.59
Bedbound	14 (3.4)	2 (2.7)	.75
Hypertension	356 (86.2)	66 (88.0)	.67
Hyperlipidemia	253 (61.3)	37 (49.3)	.053
Diabetes mellitus	256 (62.0)	48 (64.0)	.74
Smoking history	228 (55.2)	49 (65.3)	.1
Hemodialysis	144 (34.9)	31 (41.3)	.28
Cerebrovascular disease	94 (22.8)	15 (20.0)	.6
Coronary artery disease	209 (50.6)	53 (70.7)	<.001
Atrial fibrillation or flutter	136 (33.0)	27 (36.0)	.62
LVEF, %	63.2 ± 6.6	32.8 ± 4.3	.0013
Serum albumin, g/dL	3.6 ± 0.6	3.5 ± 0.6	.017
BNP, pg/mL	269.0 ± 320.6	609.6 ± 787.5	<.001
ABI	0.59 ± 0.25	0.54 ± 0.2	.13
CLTI	197 (47.7)	41 (54.7)	.27
Rutherford category			
2	90 (21.8)	16 (21.3)	.93
3	126 (30.5)	18 (24.0)	.26
4	47 (11.4)	6 (8.0)	.39
5	128 (31.0)	28 (37.3)	.28
6	22 (5.3)	7 (9.3)	.18
Aspirin	273 (66.1)	58 (77.3)	.055
P2Y12i	330 (79.9)	58 (77.3)	.61
Cilostazol	69 (16.7)	9 (12.0)	.31
Oral anticoagulant	118 (28.6)	23 (30.7)	.72
β-Blocker	213 (51.6)	49 (65.3)	.028
ACEi/ARB	207 (50.1)	35 (46.7)	.58
MRA	47 (11.4)	11 (14.7)	.42
Statin	227 (55.0)	41 (54.7)	.96

ABI, Ankle brachial index; *ACEi*, angiotensin-converting enzyme inhibitor; *ARB*, angiotensin II receptor blocker; *BMI*, body mass index; *BNP*, brain natriuretic peptide; *CLTI*, chronic limb-threatening ischemia; *HFpEF*, heart failure with preserved ejection fraction; *HFrEF*, heart failure with reduced ejection fraction; *LVEF*, left ventricular ejection fraction; *MRA*, mineralocorticoid receptor antagonist; *P2Y12i*, P2Y12 inhibitor.
Values are mean ± standard deviation or numbers (%), unless otherwise specified.

contemporary EVT techniques or were limited to single-center cohorts. The present study extends these findings by demonstrating, in a large multicenter cohort treated in the modern EVT era, that HFrEF remains a robust predictor of mortality, whereas HFpEF does not. Notably, the differential prognostic impact between HFrEF and HFpEF observed in our study aligns with that reported in studies involving general cardiovascular cohorts.[18,19] Importantly, this study is among the first to show that HF phenotype confers differential prognostic implications in patients with PAD undergoing EVT, with HFrEF associated with the highest risk of adverse outcomes. A focused Research Letter derived from the same multicenter registry has previously been published in the *European Journal of Vascular and Endovascular Surgery*; however, the present study provides a substantially expanded analysis with additional multivariable and subgroup analyses focused on prognostic stratification according to HF phenotype and PAD severity.[20] The higher mortality observed in patients with HFrEF was

Table IV. The independent predictors of all-cause mortality according to heart failure phenotype

	Multivariate	
Variable	Hazard ratio (95% CI)	*P* value
Age >75 years	2.00 (1.33, 3.02)	<.001
CLTI	2.20 (1.43, 3.38)	<.001
HFrEF	1.81 (1.16, 2.82)	.009
Hemodialysis	1.91 (1.29, 2.82)	.001
Serum albumin <3.0 g/dL	2.10 (1.32, 3.34)	.0016

CI, Confidence interval; *CLTI*, chronic limb-threatening ischemia; *HFrEF*, heart failure with reduced ejection fraction.

accompanied by significantly higher rates of both cardiac death and infection-related death, suggesting that systemic cardiovascular dysfunction and frailty may both contribute to the poor prognosis in this population.

Several mechanisms may explain the strong association between HFrEF and mortality after EVT. Reduced cardiac output and limited hemodynamic reserve may impair systemic and limb perfusion despite successful revascularization. In addition, HFrEF is frequently accompanied by renal dysfunction, malnutrition, inflammation, and frailty, which are also common in advanced PAD.[21,22] Therefore, in patients with CLTI, the survival benefit expected from limb revascularization may be limited when severe systemic cardiovascular disease is present.

The prognostic impact of HF phenotype was particularly evident in patients with CLTI. In this subgroup, HFrEF was associated with markedly higher mortality compared with HFpEF, whereas no significant difference was observed in patients with IC. These findings suggest that revascularization alone may be insufficient to improve survival in patients with CLTI and HFrEF. This subgroup likely represents a population in whom systemic disease burden outweighs the benefit of local revascularization.

These findings have important clinical implications. Importantly, our results should not be interpreted as suggesting that patients with HFrEF should be denied EVT. Rather, HF phenotype may help identify patients who require more intensive perioperative and long-term cardiovascular management after revascularization. In patients with CLTI and HFrEF, preprocedural assessment of LVEF may support shared decision-making regarding expected survival, procedural goals, and the intensity of postprocedural follow-up. These patients may benefit from multidisciplinary management involving vascular specialists, cardiologists, and HF specialists, including optimization of guideline-directed medical therapy for HF and close surveillance after EVT. Thus, incorporation of HF phenotype into clinical risk stratification may help distinguish patients whose long-term prognosis is driven primarily by systemic cardiovascular vulnerability rather than limb ischemia alone.

Limitations. The present study has limitations inherent to its retrospective and observational design, including potential residual confounding. First, detailed data on

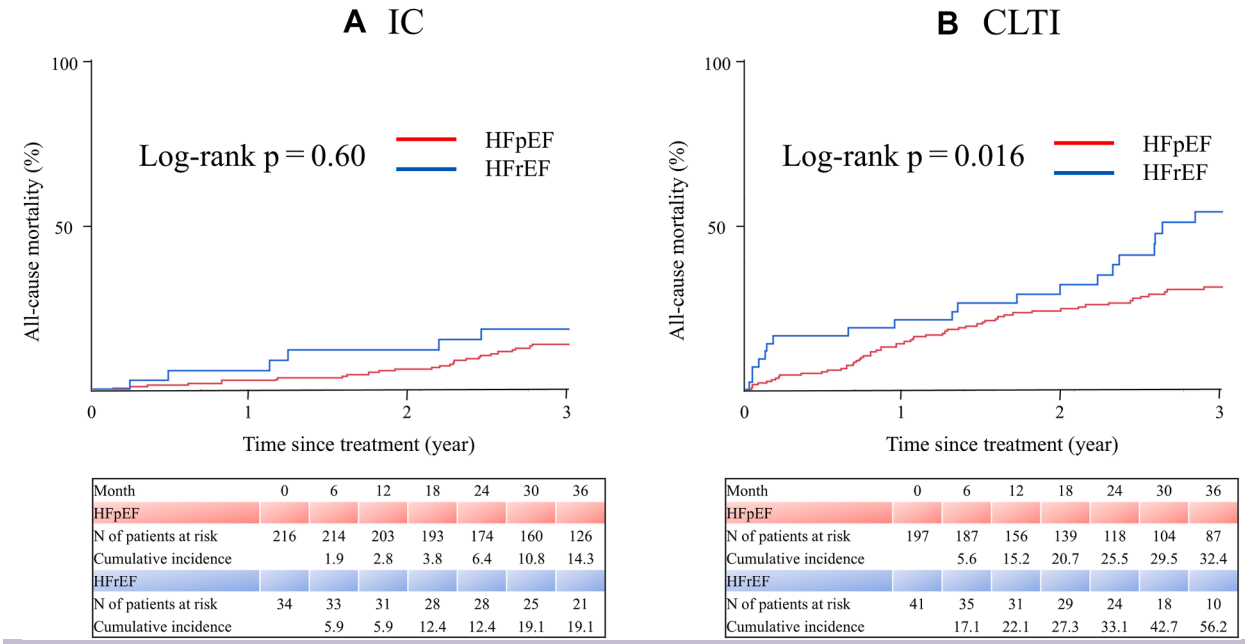

Fig 3. Kaplan-Meier curves for all-cause mortality according to heart failure phenotype stratified by disease severity after endovascular therapy. **A,** Kaplan-Meier curves for patients with intermittent claudication. **B,** Kaplan-Meier curves for patients with chronic limb-threatening ischemia (*CLTI*). *HFpEF*, Heart failure with preserved ejection fraction; *HFrEF*, heart failure with reduced ejection fraction; *IC*, intermittent claudication.

Table V. The independent predictors of all-cause mortality among patients with chronic limb-threatening ischemia

	Multivariate	
Variable	Hazard ratio (95% CI)	*P* value
Age >75 years	1.90 (1.16, 3.10)	.01
HFrEF	1.92 (1.15, 3.21)	.013
Hemodialysis	1.87 (1.18, 2.97)	.008
Serum albumin <3.0 g/dL	2.13 (1.31, 3.44)	.002

CI, Confidence interval; *HFrEF*, heart failure with reduced ejection fraction.

HF etiology, biomarker levels, and medication adherence were not uniformly available. Second, patients with midrange ejection fraction were excluded from the subgroup analysis because of their small number, which may have limited our understanding of this intermediate group. Third, procedural strategies, device selection, and completeness of revascularization were at the discretion of the treating physicians, which may have influenced outcomes. In addition, the data on procedural success were not collected in the SETers registry and therefore could not be evaluated. Fourth, the study population consisted entirely of patients from Japanese centers, highlighting the need for external validation in other ethnic groups and health care settings. Fifth, we did not adjust the mortality analyses for postprocedural limb-related events, such as major amputation or postinterventional complications, because these events occur after EVT and may represent mediators rather than baseline confounders in the causal pathway between HF and mortality. Future studies should evaluate the interaction between limb-related outcomes and long-term survival after EVT. Finally, the relatively small number of patients with HFrEF may have limited the statistical power of subgroup analyses.

CONCLUSIONS

In patients with PAD undergoing EVT, the presence of HF was associated with markedly worse long-term mortality. Among HF phenotypes, HFrEF conferred the greatest mortality risk, particularly in patients with CLTI. HF phenotype may provide useful prognostic information for risk stratification in patients with PAD undergoing EVT.

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AUTHOR CONTRIBUTIONS

Conception and design: YS, EK, SK, MA
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