

Supplementary material

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Table S1. Study group characteristic

	HFpEF	HFmrEF	HFrEF	P
Study group demographics				
	Me (25-75%)	Me (25-75%)	Me (25-75%)	
Age [years]	70 (64-76)	66 (63-75)	68 (62-75)	0.69
BMI [kg/m ²]	31.7 (29.4-34.3)	29 (25.9-32.9)	29.4 (28.7-32.7)	0.36
BSA [m ²]	2 (1.9-2.3)	2 (1.9-2.1)	2.1 (1.8-2.1)	0.61
Sex				
	N(%)	N(%)	N(%)	
Female	5 (33.3%)	6 (40%)	2 (13.3%)	0.24
Male	10 (66.7%)	9 (60%)	13 (87.7%)	
Medical interview data				
Arterial hypertension	12 (80%)	14 (93.3%)	13 (86.7%)	0.42
Diabetes	12 (80%)	<u>7 (43.7%)</u>	<u>6 (40%)</u>	<u>0.049**</u>

Atrial fibrillation	9 (60%)	5 (33.3%)	8 (53.3%)	0.32
Hypercholesterolemia	15 (100%)	15 (100%)	15 (100%)	1.0
Chronic coronary syndrome	10 (66.7%)	12 (80%)	13 (86.7%)	0.33
History of percutaneous coronary interventions	4 (26.7%)	10 (66.7%)	9 (60%)	0.051
Pharmacological treatment				
ACEI	11 (73.3%)	14 (93.3%)	14 (93.3%)	0.26
ARB	4 (26.7%)	1 (6.7%)	1 (6.7%)	0.26
Beta blockers (other than nebivolol* or carvedilol*)	15 (100%)	15 (100%)	15 (100%)	1.0
ASA (cardioprotective doses)	10 (66.7%)	12 (80%)	10 (66.7%)	0.35
Spirolactone or eplerenone	15 (100%)	15 (100%)	15 (100%)	1.0
Loop diuretics (furosemide, torasemide or combined)	15 (100%)	15 (100%)	15 (100%)	1.0
Statins (atorvastatin or rosuvastatin)	15 (100%)	15 (100%)	15 (100%)	1.0
Hydrochlorothiazide, Calcium blockers, long-acting nitrates, PDE-5i, doxazosin, tamsulosin, NSAIDs (other than ASA)*	0	0	0	1.0

*substances widely used in the treatment of cardiologic and non-cardiologic diseases, that may affect the endothelium function and/or bioavailability of nitric oxide

** Fisher's exact test (performed on a 3×2 table)

ACEI – angiotensin-converting-enzyme inhibitors; ARB – angiotensin receptor blockers; ASA – *acetylsalicylic acid*; BMI – body mass index; BSA – body surface area; HFmrEF – heart failure with mildly reduced ejection fraction; HFpEF – heart failure with preserved ejection fraction; HFrEF – heart failure with reduced ejection fraction; MRA – mineralocorticoid receptor antagonists; NSAIDs – non-steroidal anti-inflammatory drugs; PDE-5i – phosphodiesterase type 5 inhibitor;

Laboratory tests results				
	HFpEF	HFmrEF	HFrEF	p
	Me (25-75%)	Me (25-75%)	Me (25-75%)	
NT-proBNP [pg/ml]	876.6 (603.7-2201)	783.9 (430.6-1 680)	1 919 (1 107-3 722)	0.052
CRP [mg/L]	4.2 (1.9-5.5)	1.6 (1.1-8.1)	2.7 (1.3-10.3)	0.7
Hgb [g/dL]	13.3 (11.9-14.5)	13.4 (11.8-14.7)	13 (11-15.1)	0.98
Urea [mg/dL]	7.7 (5.5-12.1)	7.8 (5.7-9.9)	7.95 (7.1-9.6)	0.85
Creatinine [μmol/l]	100 (71.4-156.3)	98.7 (85.8-128.6)	108.1 (93.2-134.6)	0.76
GFR [ml/min/1,73 m ²]	57.5 (40.2-86.3)	66.7 (47.5-72.2)	59.1 (41.3-73.5)	0.92
Transthoracic echocardiography results				
EF [%]	54 (52-58)	46 (43-48)	26 (23-36)	NA
LVDD - LAX [mm]	<u>51 (46-55)</u>	53 (47-58)	<u>63 (59-68)</u>	<0.001**
IVSDD - LAX [mm]	11 (10-12)	11.5 (10-12)	11 (10-12)	0.79
PWDD - LAX [mm]	10 (9-11)	10 (9-12)	10.5 (8-12)	0.96
RVDD - LAX [mm]	30 (27-34)	32 (28-35)	32 (31-37)	0.25
TAPSE [mm]	<u>22 (20-24)</u>	21.5 (19-23)	<u>16 (14-19)</u>	0.003**
LA volume [ml]	74 (46-100)	71 (54-111)	100 (82-117)	0.09
LAVI [ml/m ²]	32.1 (24-45)	49 (33-55)	49.3 (42.5-59)	0.051
RA area [cm ²]	17.4 (13.5-24.1)	18 (13.3-26.5)	25 (21-27)	0.15
Mitral flow: E/A (N=24)	0.8 (0.6-0.9)	0.71 (0.69-1.27)	2.1 (0.6-3)	0.45

** Fisher's exact test (performed on a 3×2 table)

A – mitral flow A wave; CRP – C-reactive protein; E – mitral flow E wave; EF – left ventricle ejection fraction; GFR – glomerular filtration rate; Hgb – hemoglobin; IVSDD – intraventricular septum diastolic diameter; LA – left atrium; LAVI – indexed left atrium volume; LAX – long axis view; LVDD – left ventricle diastolic diameter; NT-proBNP – N-terminal pro B-type natriuretic peptide; PWDD – posterior wall diastolic diameter; RA – right atrium; RVDD – right ventricle diastolic diameter; TAPSE – tricuspid annular plane systolic excursion;;

Table S2. Results of the hemodynamic profile at rest and changes in hemodynamic parameters after nitroglycerin administration.

HEMODYAMIC PROFILE AT REST				
	HFpEF	HFmrEF	HFrfEF	
	Me (25-75%)	Me (25-75%)	Me (25-75%)	p
HR [N/min]	75 (62-85)	65 (58-71)	60 (59-71)	0.11
SV [ml]	76 (49-83)	68 (58-93)	78 (66-85)	0.70
SI [ml/BSA]	38 (26-41)	36 (34-44)	38 (30-41)	0.74
CO [ml/min]	4.9 (3.8-6)	4.4 (3.9-5.3)	4.7 (4.1-5.8)	0.75
CI [ml/min/BSA]	2.5 (2.1-3.1)	2.4 (2.1-2.8)	2.3 (2.1-2.7)	0.91
ICON [-]	34.7 (21.9-54.5)	42.7 (38.1-60.6)	46.9 (29.9-57.4)	0.51
SVV [%]	16 (12-21)	12 (8-16)	10 (6-14)	0.07
FTC [ms]	311 (297-316)	315 (304-322)	302 (294-312)	0.12
TFC [-]	27 (22-33)	30 (25-34)	31 (25-36)	0.16
SVR [dyns/cm ⁵]	1 297 (1 085-1 578)	1 387 (1 198-1 780)	1 373 (1 202-1 681)	0.67
SVRI [dyns/cm ⁵ /BSA]	2 673 (2 095-3 531)	2 696 (2 064-3 388)	2 701 (2 405-3 520)	0.86
STR [-]	0.46 (0.37-0.51)	0.34 (0.28-0.42)	0.47 (0.39-0.59)	0.02
PEP [ms]	121 (114-137)	115 (85-131)	130 (116-154)	0.049
LVET [ms]	281 (270-304)	313 (284-324)	294 (282-301)	0.07
CPI [-]	0.5 (0.37-0.61)	0.48 (0.34-0.57)	0.45 (0.39-0.57)	0.72

CHANGE IN HEMODYNAMIC PROFILE AFTER NTG ADMINISTRATION				
	HFpEF	HFmrEF	HFrfEF	P
	Me (25-75%)	Me (25-75%)	Me (25-75%)	
Δ HR [N/min]	0 (-1-3)	3 (0-4)	2 (1-8)	0.23
Δ SV [ml]	2 (-7-8)	-4 (-6-(-1))	2 (-4-6)	0.01
Δ SI [ml/BSA]	1 (-3-4)	-2 (-3-(-1))	1 (-2-2)	0.02
Δ CO [ml/min]	0.4 (0.2-0.8)	-0.2 (-0.3-0.05)	0.4 (0.1-0.9)	0.005
Δ CI [ml/min/BSA]	0.2 (-0.3-0.3)	-0.1 (-0.1-0)	0.2 (0.1-0.5)	0.008
Δ ICON [-]	1.3 (-1.3-4.9)	-0.9 (-3.4-1.2)	-0.2 (-4.6-7.1)	0.51
Δ SVV [%]	1 (-4-2)	0 (-1-4)	2 (-1-6)	0.35
Δ FTC [ms]	2 (-22-14)	-9 (-16-(-1))	7 (-1-15)	0.04
Δ TFC [-]	0 (-1-0)	0 (-1-0)	0 (-1-0)	0.69
Δ SVR [dyns/cm ⁵]	-117 (-179-58)	12 (-27-55)	-72.0 (-175-(-35))	0.03
Δ SVRI [dyns/cm ⁵ /BSA]	-240 (-376-138)	26 (-56-109)	-145 (-361-(-61))	0.03
Δ STR [-]	0.03 (-0.02-0.06)	0.04 (0.02-0.08)	0.01 (-0.01-0.1)	0.33
Δ PEP [ms]	5 (-1-10)	5 (-1-8)	4 (-5-20)	0.68
Δ LVET [ms]	-5 (-20-2)	-9 (-18-(-3))	-1 (-14-6)	0.4
Δ CPI [-]	0.03 (-0.05-0.07)	-0.01 (-0.03-0)	0.05 (0.01-0.08)	0.049

Δ - delta (change); BSA – body surface area; CI – cardiac output (index); CO – cardiac output; CPI – cardiac performance index; dyne/dyns – force unit in the CGS metric system; FTC – corrected flow time; HFmrEF – heart failure with mildly reduced ejection fraction; HFpEF – heart failure

with preserved ejection fraction; HFrEF – heart failure with reduced ejection fraction; HR – heart rate; ICON – index of contractility; LVET – left ventricle ejection time; PEP – pre-ejection period; SI – stroke volume (index); STR – systolic time ratio; SV – stroke volume; SVR – systemic vascular resistance; SVRI – systemic vascular resistance (index); SVV – stroke volume variation; TFC – thoracic fluid content;