SCOMPENSO CARDIACO 2

Moderatori: F. Ferrari, A. Rognoni, M. Pistono

Expert paneslist:

B. Bertola, A.C. Capettini, I. Casella, R. Erbetta, M. Facchini, A. Giubertoni, P. Lusardi, S. Maffè

Scompenso cardiaco avanzato e shock cardiogeno: quali device di supporto e a chi?

Simone Frea, M.D.
Unità di Cure Intensive Cardiologiche
SC Cardiologia - Dipartimento Cardio-Toraco-Vascolare
Città della Salute e della Scienza di Torino

no disclosures

Thromboembolism prophylaxis (e.g. with LMWH) is recommended in patients not already anticoagulated and with no contraindication to anticoagulation, to reduce the risk of deep venous thrombosis and pulmonary embolism.[494,495]	I	A

?

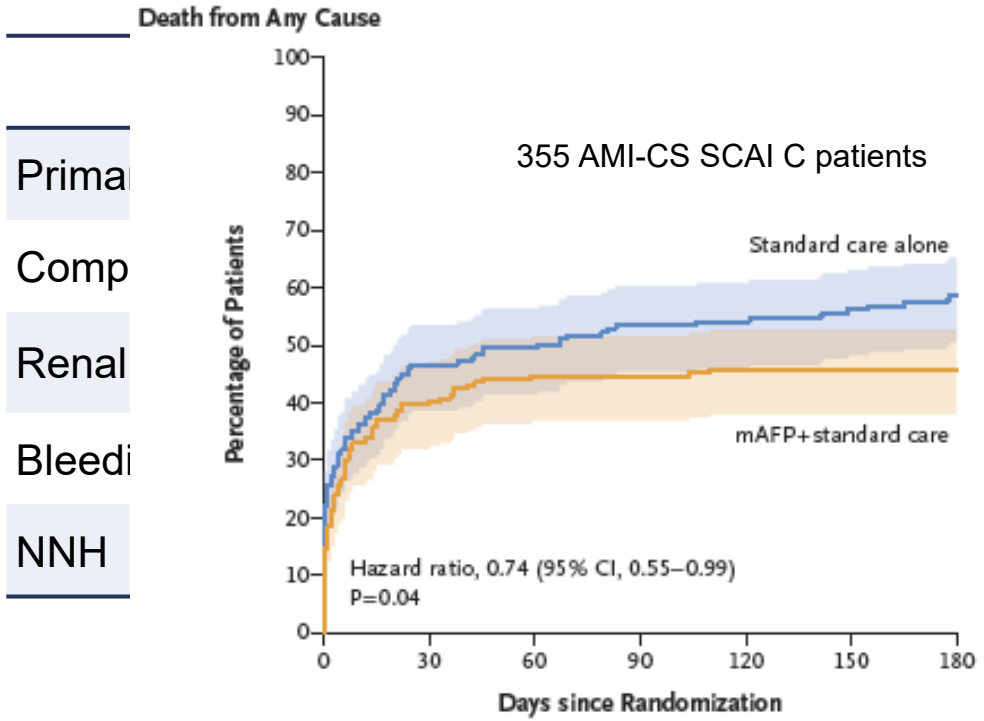
Heart transplantation is recommended for patients with advanced HF, refractory to medical/device therapy and who do not have absolute contraindications.	I	C
Long-term MCS should be considered in patients with advanced HFrEF despite optimal medical and device therapy, not eligible for heart transplantation or other surgical options, and without severe right ventricular dysfunction, to reduce the risk of death and improve symptoms.[378,396,397,401,402,404,417]	IIa	A
Long-term MCS should be considered in patients with advanced HFrEF refractory to optimal medical and device therapy as a bridge to cardiac transplantation in order to improve symptoms, reduce the risk of HF hospitalization and the risk of premature death.[398–400,402,404]	IIa	B

Simone Frea, M.D.
Unità di Cure Intensive Cardiologiche
Città della Salute e della Scienza di Torino

Prima
Comp
Renal
Bleedi
NNH

Impella

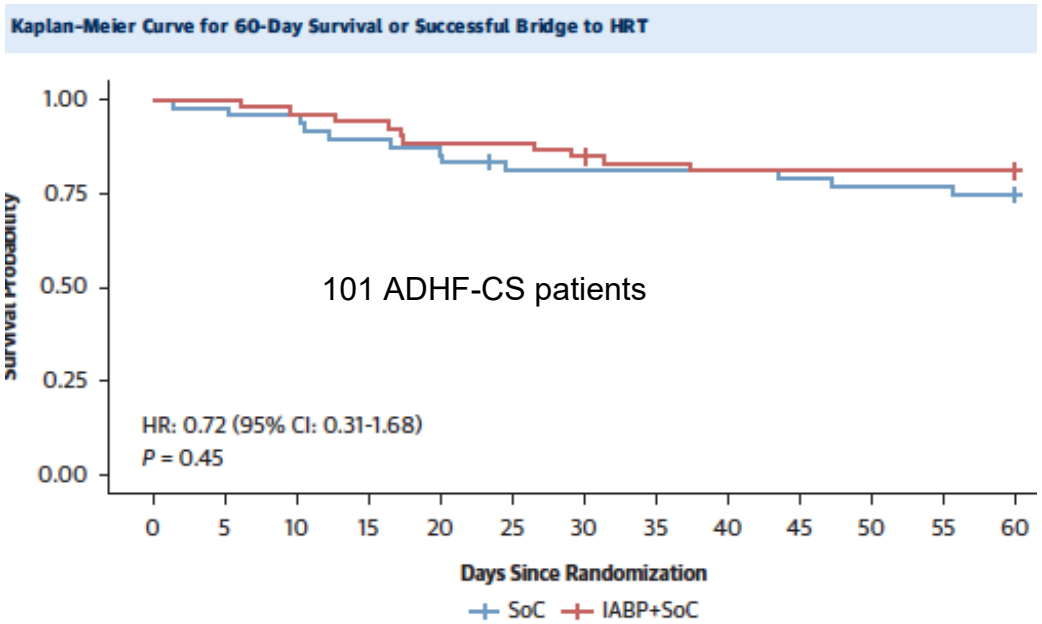
Microaxial Flow Pump or Standard Care in Infarct-Related Cardiogenic Shock



IABP

Early Intra-Aortic Balloon Support for Heart Failure-Related Cardiogenic Shock

A Randomized Clinical Trial



Simone Frea, M.D.
Unità di Cure Intensive Cardiologiche
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how to choose a device for CS?

etiology

not only flow

predictors

the strange case of the RV

etiology again

etiology and clinical impact of IAoBP

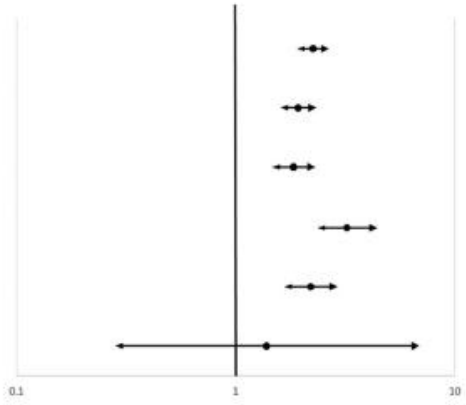
Percutaneous Microaxial Ventricular Assist Device Versus Intra-Aortic Balloon Pump for Nonacute Myocardial Infarction Cardiogenic Shock

Atsuyuki Watanabe, MD; Yoshihisa Miyamoto, MD, PhD; Hiroki Ueyama, MD; Hiroshi Gotanda, MD, PhD; Yusuke Tsugawa, MD, MPH, PhD†; Toshiki Kuno, MD, PhD†

1300 ADHF-CS patients
medicare database
propensity score matching

Analysis Method	aOR (95% CI)
Unadjusted	2.25 (1.89 to 2.67)
PSMW	1.92 (1.59 to 2.33)
PSM	1.83 (1.46 to 2.31)
Logistic Regression with Hospital Fixed Effect	3.22 (2.35 to 4.42)
PSMW with MCS on Days 0–1	2.20 (1.66 to 2.91)
Instrumental Variable	1.38 (0.28 to 6.89)

OR for 30-day mortality



major issues:
- patients aged 65 to 99 years
- excluded patients with both pVAD and IABP

Outcomes	Matching weight analysis		
	pVAD (N=645)	IABP (N=639)	Effect estimate
Binary outcomes			aOR (95% CI)
30-d mortality	355 (55.0)	248 (38.9)	1.92 (1.59– 2.33)
Bleeding	176 (27.2)	174 (27.1)	1.00 (0.81–1.24)
Stroke	27 (4.1)	29 (4.5)	0.91 (0.56– 1.47)
Sepsis	50 (7.7)	54 (8.4)	0.91 (0.64–1.28)
Continuous outcomes			aMD (95% CI)
LOS among survivors, d	11.0 (6.0–21.0)	12.0 (7.0–20.0)	0.4 (–1.4 to 2.3)
Total health care spending, USD	108 426 (83326–155 553)	55 452 (36318–110 533)	*19318 (–11 582 to 50 217)

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Unità di Cure Intensive Cardiologiche
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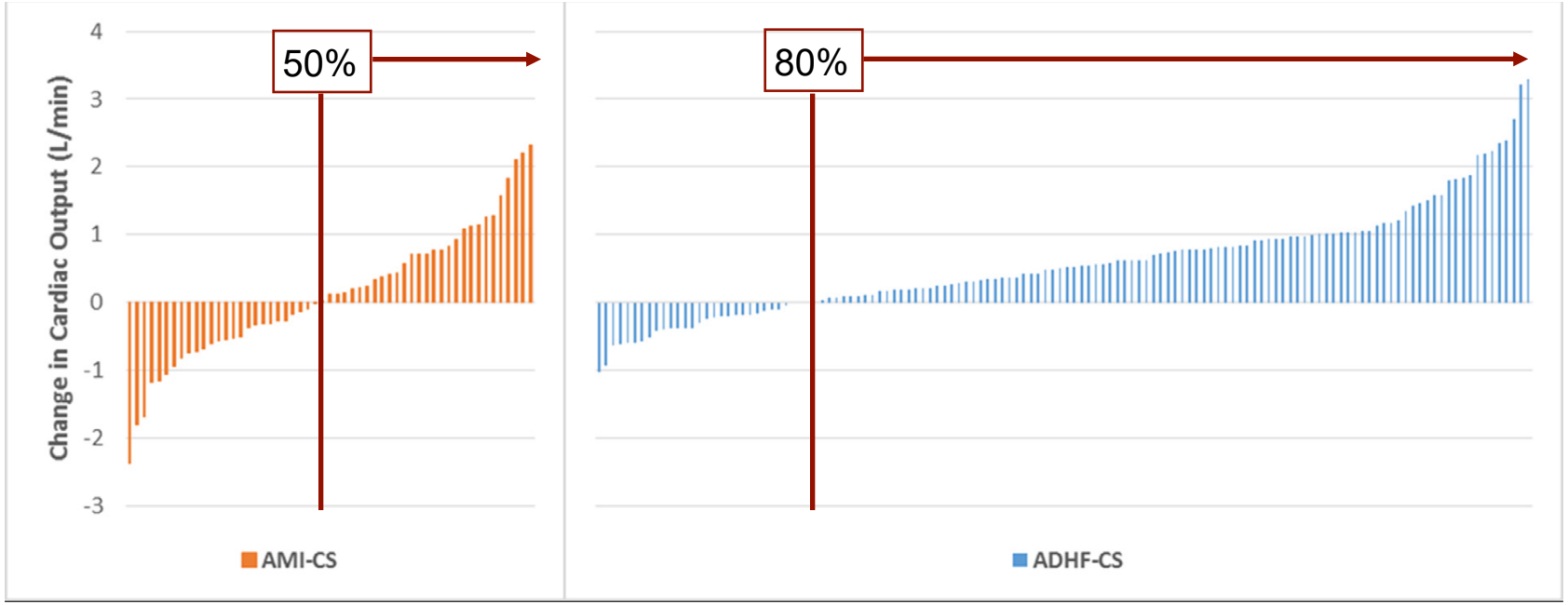
etiology and hemodynamic response to IAoBP

retrospective analysis
205 patients



Malick W et al. Comparison of the hemodynamic response to IABP in patients with cariogenic shock resulting from acute myocardial infarction vs. acute decompensated heart failure. Am J Cardiol 2019;124:1947-1953

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Unità di Cure Intensive Cardiologiche
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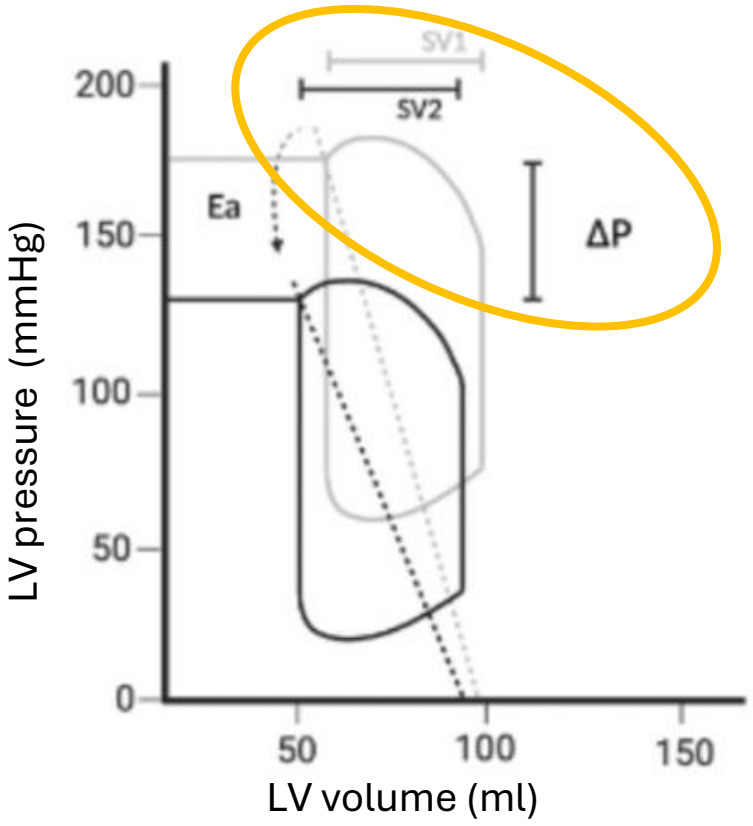
different gain of flow by afterload reduction

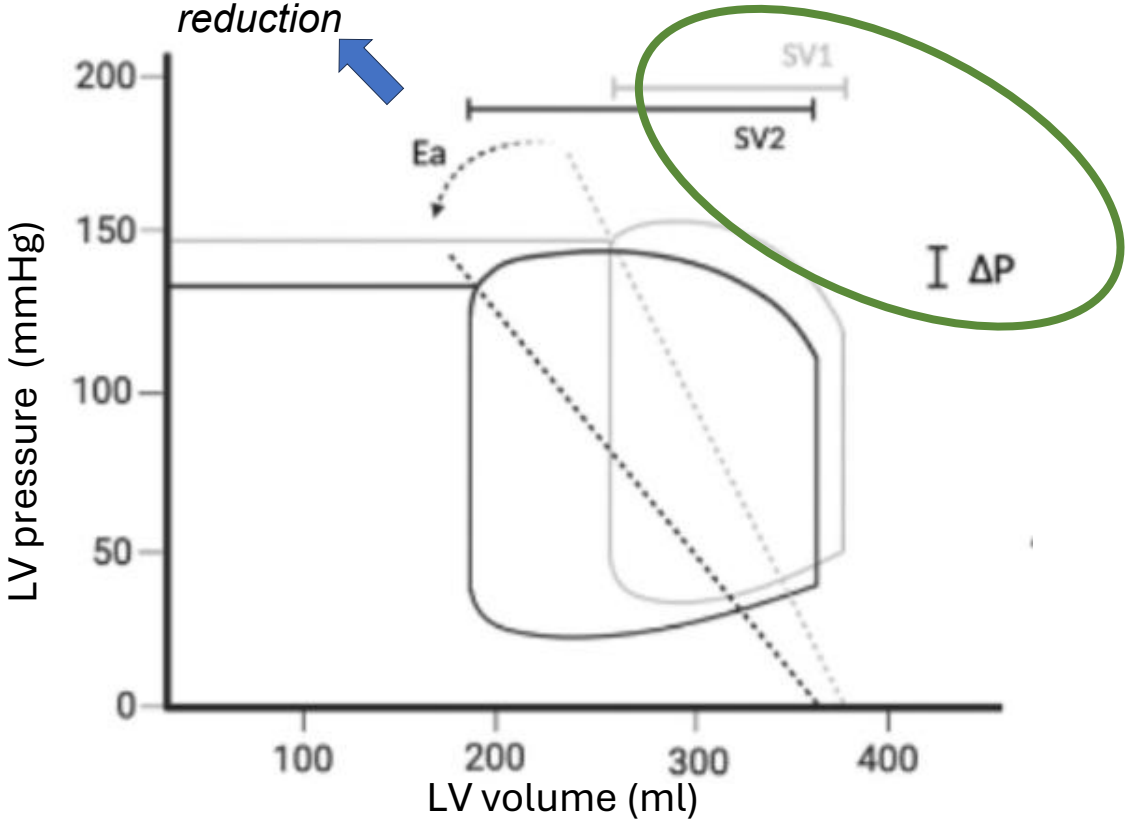
AMI-CS



ADHF-CS

large SV increase with low BP reduction

afterload reduction



Afterload Is A Key Treatment Target In ADHF-CS

Bocchino P. P. et al. Expert Opinion on Drug Safety, 1–4.

Baldetti L, Gallone G. ESC Heart Failure 2024; 11: 615–618

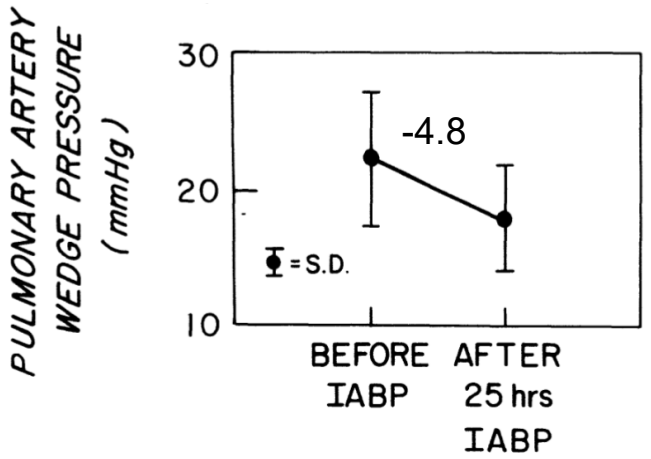
Simone Frea, M.D.
Unità di Cure Intensive Cardiologiche
Città della Salute e della Scienza di Torino

not only flow but WP reduction

Hemodynamic changes observed with IABP insertion

	ADHF-CS (n = 132)	AMI-CS (n = 73)	p Value
Mean arterial pressure (mm Hg)	−1.4 ± 13.9	1.3 ± 17.1	0.26
Change in cardiac output (L/min)	0.58 ± 0.79	0.12 ± 1.00	0.0009
Change in cardiac index (L/min/m^2)	0.30 ± 0.42	0.08 ± 0.51	0.003
Cardiac output percent change (%)	23.9 ± 35.2	10.1 ± 36.6	0.02
Cardiac power output (W)	0.09 ± 0.17	0.03 ± 0.20	0.06
Cardiac power index (W/m^2)	0.05 ± 0.0.9	0.02 ± 0.11	0.09
Central venous pressure (mm Hg)	−2.0 ± 5.2	−2.5 ± 6.6	0.59
Mean pulmonary artery pressure (mm Hg)	−5.3 ± 7.4	−5.0 ± 7.6	0.78

40 AMI-CS patients:
60-65% IABP “responders”



Malick W et al. Am J Cardiol 2019;124:1947-1953

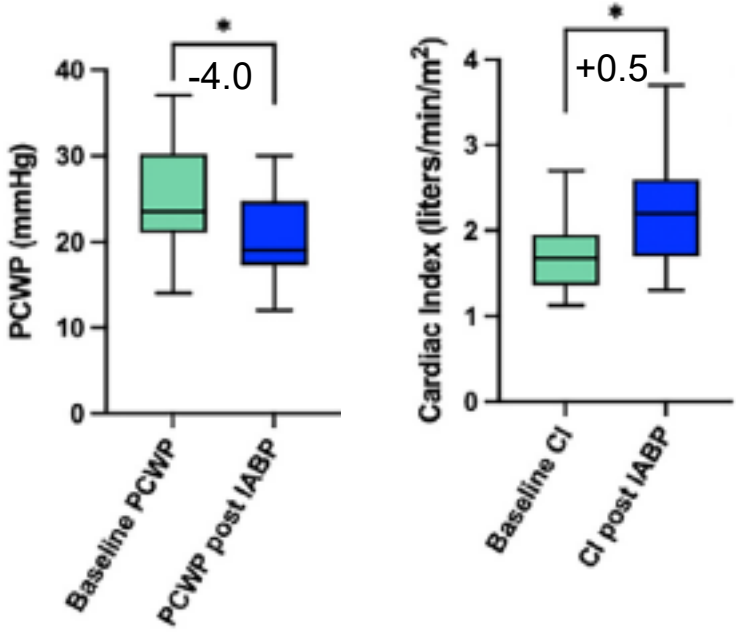
Dunkman WB, et al. Clinical and hemodynamic results of intra-aortic balloon pumping and surgery for cardiogenic shock. Circ. 1972;46:465-77

not only flow but WP reduction

even in “not Impella-friendly” hearts

23 amyloid-CS pts

Echocardiographic	
LVEF, %	37 ±14
LVEDD, cm	4.0 ± 0.5
LV posterior wall thickness, cm	1.67 ± 0.4
IVS wall thickness, cm	1.72 ± 0.5

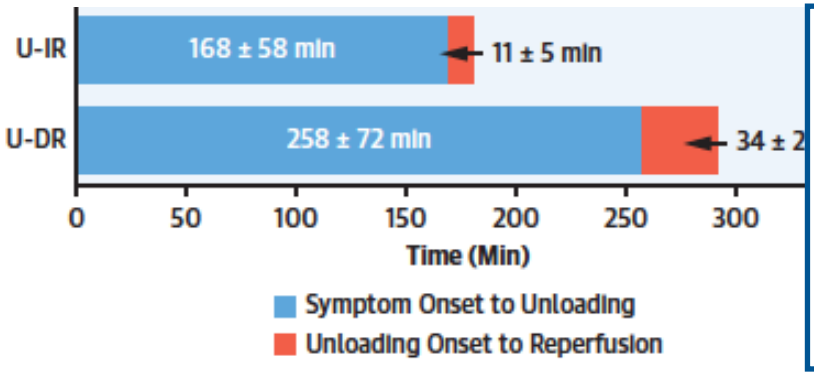


Longinow J, et al. Hemodynamic response after intra-aortic ballon counter-pulsation in cardiac amyloidosis and cardiogenic shock. J of Cardiac Failure 2024;30:1255-1264

Simone Frea, M.D.
Unità di Cure Intensive Cardiologiche
Città della Salute e della Scienza di Torino

not only flow but myocardial preservation

23 patients from STEMI-DTU pilot trial

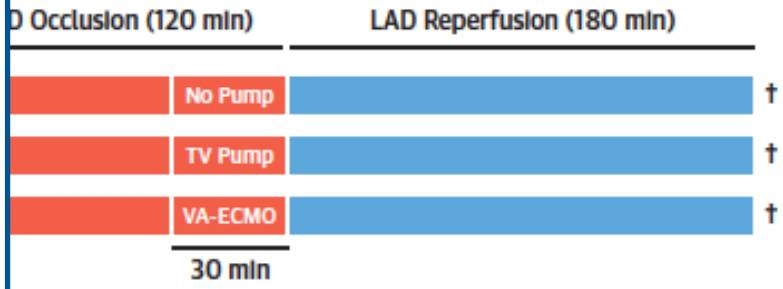


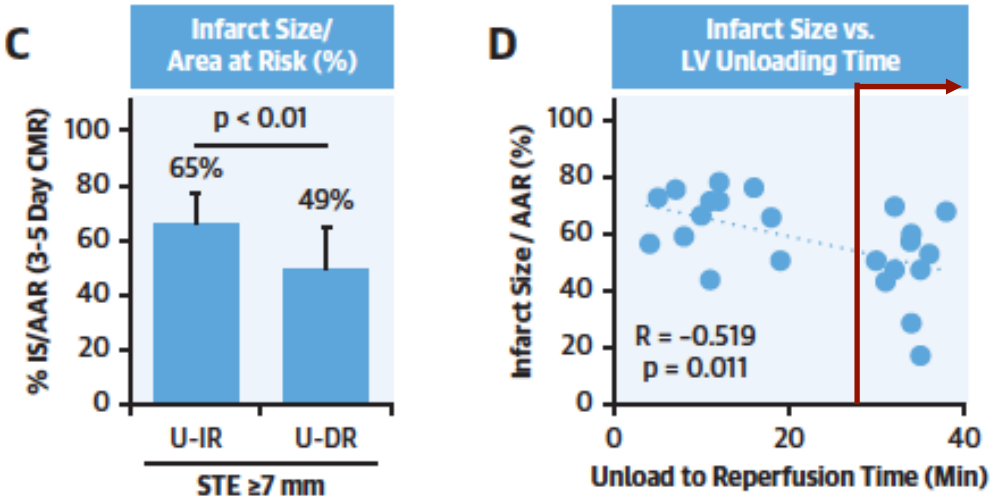
Trial Designs

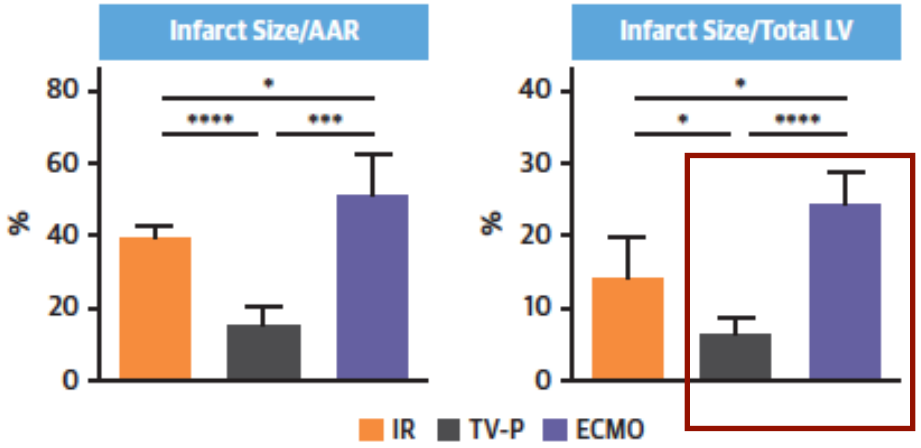
Primary left ventricular unloading with delayed reperfusion in patients with anterior ST-elevation myocardial infarction: Rationale and design of the STEMI-DTU randomized pivotal trial

Navin K. Kapur MD [a], Raymond J. Kim MD [b], Jeffrey W. Moses MD [c,e], Gregg W. Stone MD [d], James E. Udelson MD [a], Ori Ben-Yehuda MD [e], Bjorn Redfors MD, PhD [e], Melek Ozgu Issever MS [e], Noam Josephy MD, MSc, MBA [f,g], Samantha J. Polak MD, PhD [f], William W. O'Neill MD [h]

Male swines





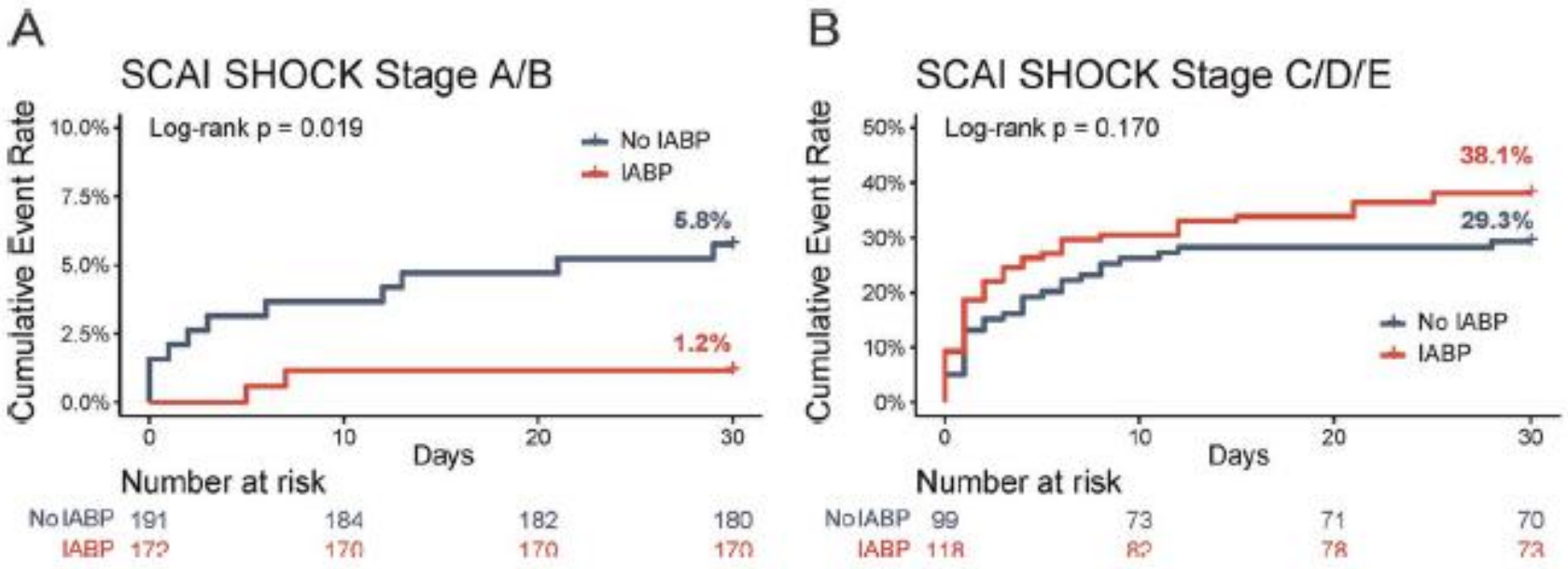


Swain L, et al.Transvalvular ventricular unloading before reperfusion in acute myocardial infarction. JACC 2020;76:684-99

clinical predictors of response to IABP: SCAI stage

5343 AMI patients

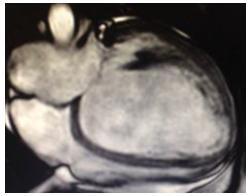
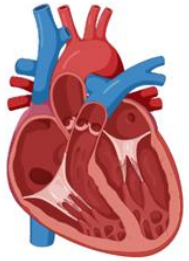
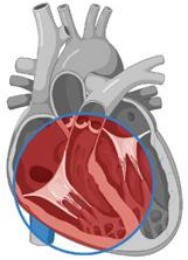
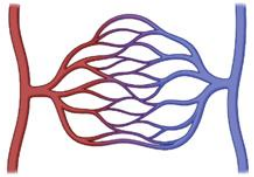
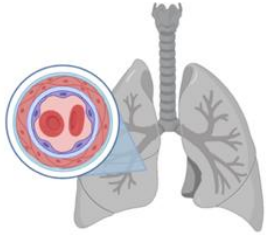
INTRA-AORTIC BALLOON PUMP REDUCES 30-DAY MORTALITY IN EARLY-STAGE CARDIOGENIC SHOCK COMPLICATING ACUTE MYOCARDIAL INFARCTION ACCORDING TO SCAI CLASSIFICATION



Da Luo et al. IABP reduces 30-day mortality in early-stage cardiogenic shock complicating AMI according to SCAI classification. SHOCK 2023;60:385-391

Simone Frea, M.D.
Unità di Cure Intensive Cardiologiche
Città della Salute e della Scienza di Torino

phenotyping the best responder to IABP

LV dimensions	Heart Failure	RV Function	Resistive Load	Pulmonary Circulation	Heart Rate
					
higher LVEDD moderate-severe MR	↓ CI LCPOi ≥0.33 W/m²	PAPi >2.0 ↓ CVP RCPOi ≥0.13 W/m²	↑ SVR	↑ mPAP PCWP <25 mmHg	HR <92 bpm

Fried JA et al. Clinical and hemodynamic effects of IABP in chronic heart failure patients with cardiogenic shock. J Heart Lung Transplant. 2018;37:1313–1321

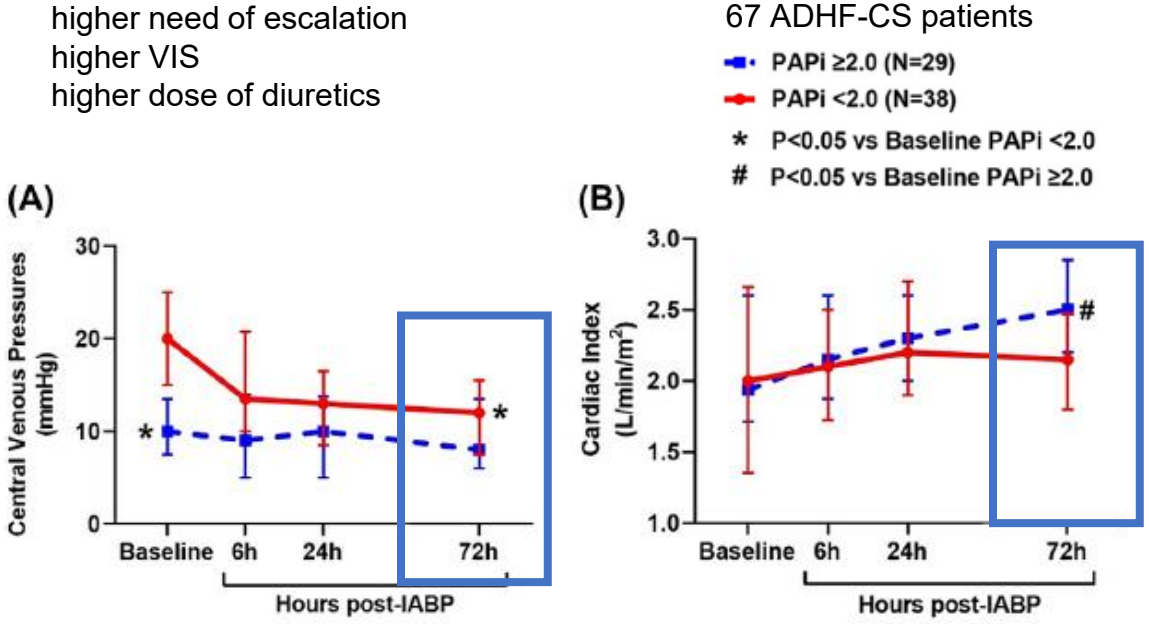
Baldetti L et al. IABP in ADHF with hypo-perfusion: from pathophysiology to clinical practice. Circ HF 2021

the strange case of RV dysfunction:

RV dysfunction predict poor response to IAoBP

RV dysfunction is associated to:
lower increase in CI
higher need of escalation
higher VIS
higher dose of diuretics

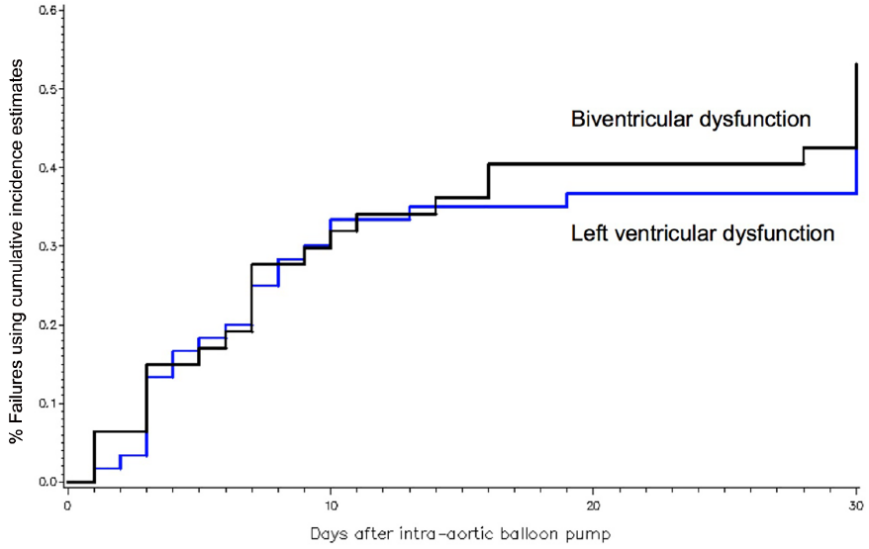
67 ADHF-CS patients



Kalapurakal G et al. Haemodynamic effects of IABP stratified by baseline pulmonary artery pulsatility index. ESC HF 2024

107 CS patients (only 15% AMI-CS)

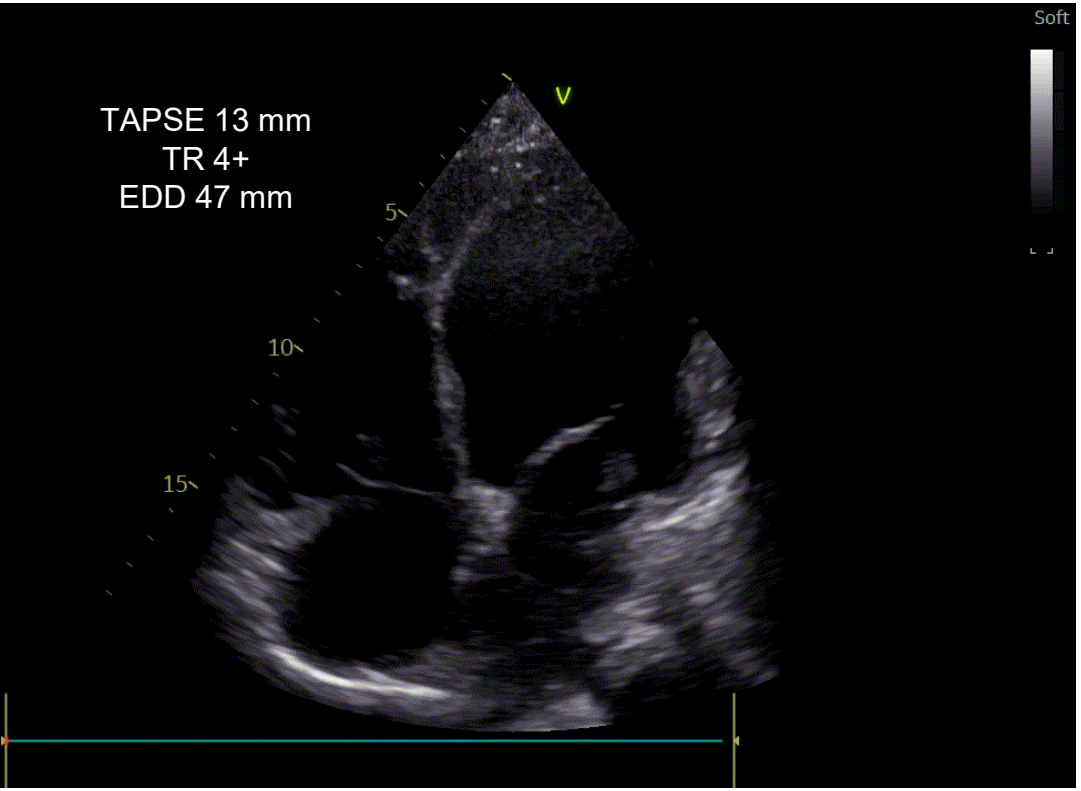
RV failure = TAPSE < 16 mm + RAP > 15 e RAP/WP > 0.6



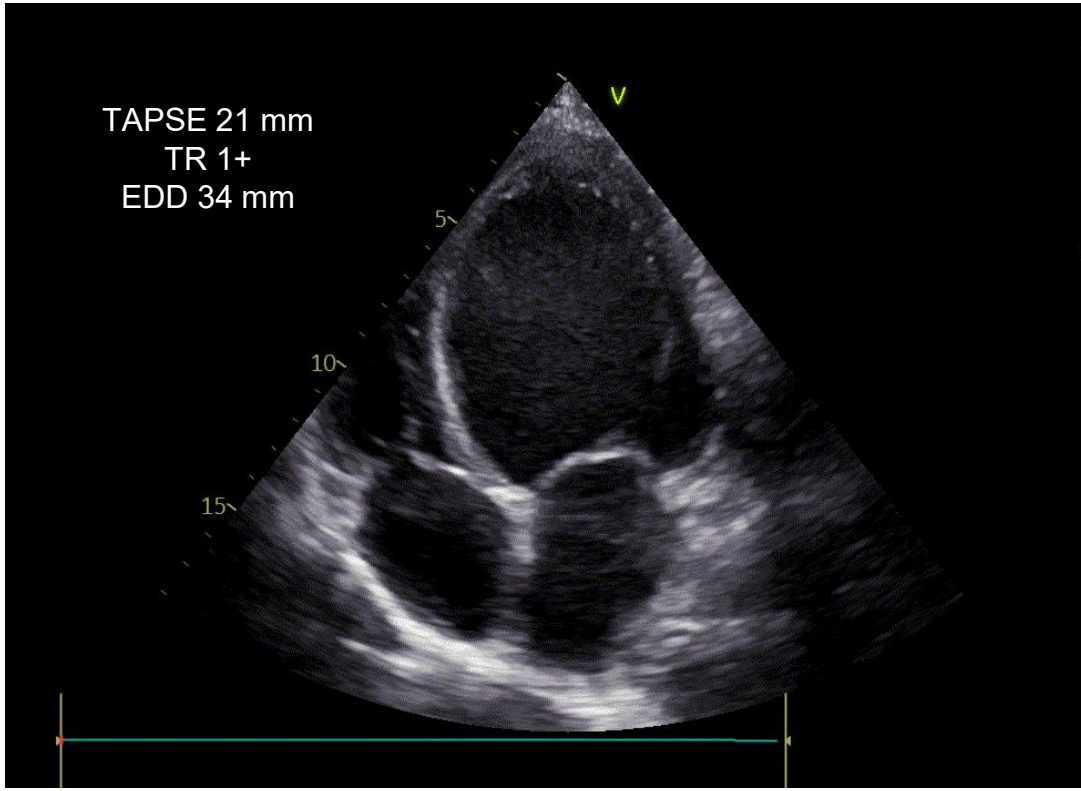
Krishnammorthy A et al. The impact of failing right heart in patients supported by IABP. Our HJ acute CV care 2016

the strange case of RV dysfunction:

RV reverse remodeling by IABP



23 days on
IAoBP and NTP

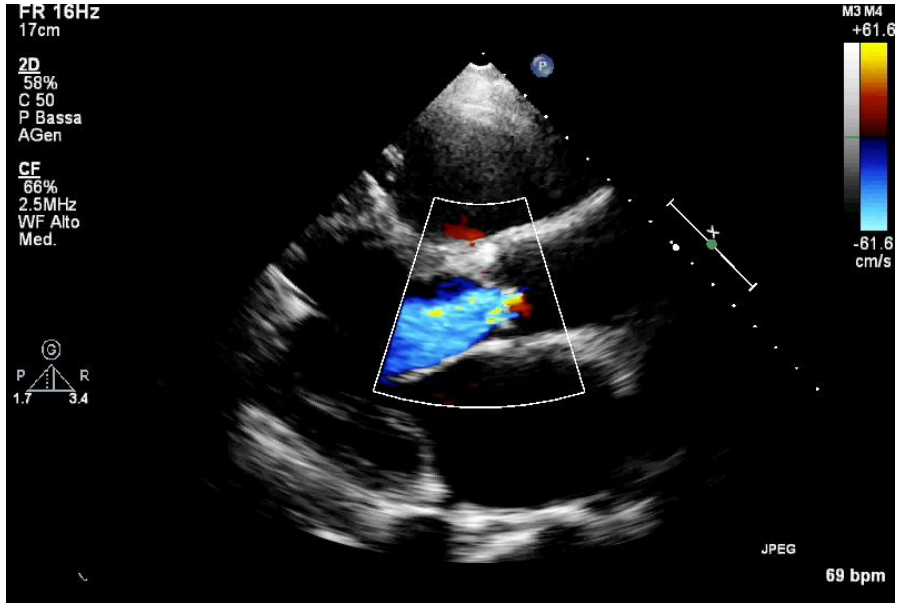


Prolonged intra-aortic balloon pump support in biventricular heart failure induces right ventricular reverse remodeling

Argyrios Ntalianis [a], Chris J. Kapelios [a], John Kanakakis [b], Evangelos Repasos [a], Christos Pantsios [a], Emmeleia Nana [a], Christos Kontogiannis [a], Konstantinos Malliaras [a], Michael Tsamatsoulis [c], Elisabeth Kaldara [a], Christos Charitos [c], John N. Nanas [a,*]

15 CMD - avg 73 days on IABP - 6 pts successful BTC-to-LVAD

Impella related aortic regurgitation



Impact of Impella Support on the Progression of Aortic Insufficiency Following L-VAD Implantation
Elad B et al.

retrospective, monocentric (Columbia),
270 HM3 patients, INTERMACS 2

sAI at 1 year post-LVAD:
Impella-pre-LVAD 36% vs. no-Impella 6%

Simone Frea, M.D.
Unità di Cure Intensive Cardiologiche
Città della Salute e della Scienza di Torino

IABP vs. pVAD

	IABP	Impella
Evidence	**C**	B
Cardiac flow	**0.3-0.5 L/min**	1.1-3.7 L/min (CP) 1.5-5.5 L/min (5.5)
Femoral artery size	> 4 mm	**5-5.5 mm (CP)** 8 mm (5.5)
Max implant days	Weeks	**5 (7) days (CP)** 14 days (5.5)
WP	↓	↓ ↓
Cardiac synchrony or stable rhythm	**Yes**	No
Aortic injury	No	**Yes**
Haemocompatibility AE	+	++
Main indications	ADHF AMI-CS SCAI B	AMI-CS SCAI C

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etiology again

	ADHF	AMI-CS
LV morphology	Large LV + MR Biv dysfunction	Small LV LV-prevalent dysfunction
Disease trajectory	slow insidious decline	rapidly evolving situation
Tolerance to hypoperfusion	high	very low
Resistive load	high	normal or low
Main hemodynamic need	afterload reduction	more flow
Primary treatment target	EO restoration	myocardial preservation
Expected outcome	disease stabilization and RV remodeling	LV myocardial recovery
MCS	IABP (timing?)	Impella (SCAI C, no vascular bed issues) IABP (SCAI B)
Support strategies	escalation	upfront

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grazie