PLACE 2026
PLATFORM OF LABORATORIES FOR ADVANCES IN CARDIAC EXPERIENCE

CONGRESSO
ROMA, 25 - 27 Giugno 2026

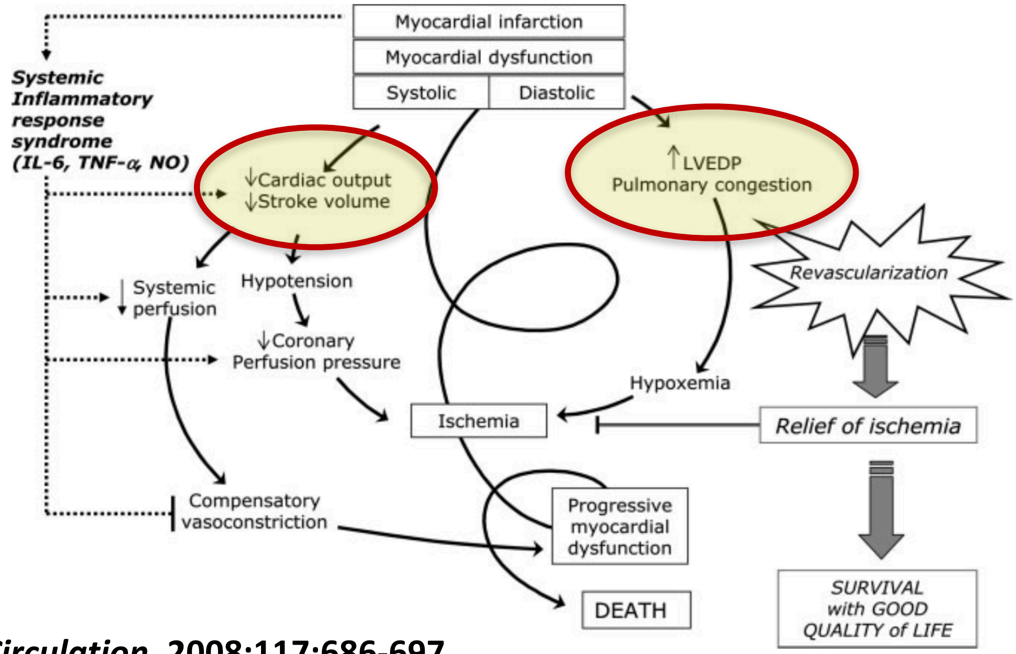
MANAGING COMPLEXITY: MCS IN HIGH RISCK PCI & CARDIOGENIC SHOCK

Nuovi orizzonti nel trattamento dello STEMI

Stefano Benenati, MD PhD
Cardiologia Interventistica
Policlinico San Martino, Genova

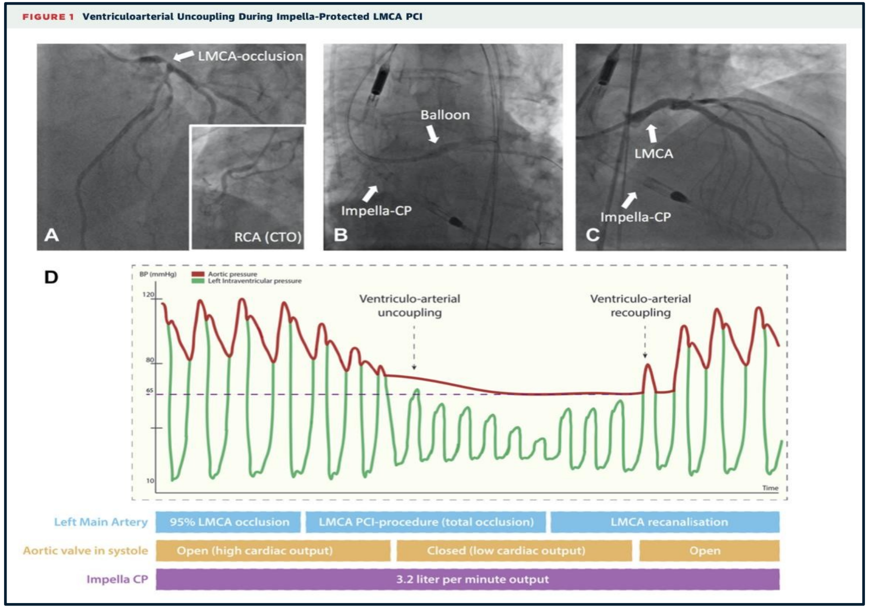
I received speaker fees from AMGEN and Daiichi-Sankyo

AMI-CS: not just an occluded artery



Reynolds & Hochman - Circulation. 2008;117:686-697

Rationale behind mechanical circulatory support



- Significant temporary (and sometimes prolonged) reductions in CO and increasing filling pressures during PCI in vulnerable patients with little to no physiologic reserve
- Repeated peri-PCI ischemic insults
- Maximum developed LV pressure may fall below MAP, after which heart no longer ejects blood, aortic valve no longer opens, and systemic circulation is no longer maintained
- Potentially catastrophic consequences at worst (and possibly suboptimal PCI at best)

Potts et al *Catheter Cardiovasc Interv* 2019 Vandenbriele et al *JACC Interv* 2019 Truesdell *Cardiovasc Revasc Med* 2020

Rationale behind mechanical circulatory support

SURGEON (CABG)

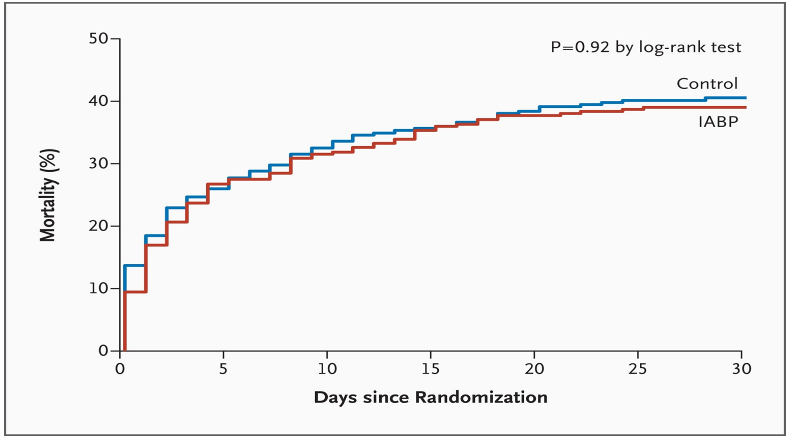
- Sedation and Anesthesia: Supervised by Anesthesiologist, Provided by CRNA
- Imaging: Provided by Anesthesiologist or Cardiologist
- Hemodynamics & Perfusion: Provided by Perfusionist
- Procedure: Performed by Surgeon

CARDIOLOGIST (PCI)

- Sedation and Anesthesia: Supervised by Cardiologist and provided by Nurse
- Imaging: Supervised by Cardiologist
- Hemodynamics & Perfusion: Supervised and managed by Cardiologist
- Procedure: Performed by Cardiologist

- "Auto-Pilot" (MCS) and "Co-Pilot" (RCIS)…
- Risk:benefit analysis may evolve with experience, volume, career-stage…

MCS has been struggling to improve outcome in CS – have you ever wondered why?



Limitations

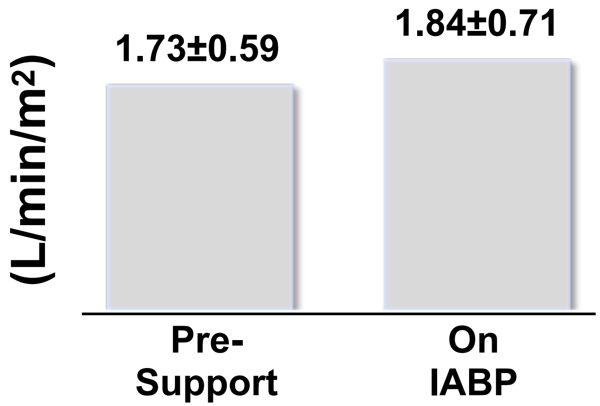
- 10% asymmetrical cross-over through IABP arm;
- Lack of haemodynamic data and shock stage definition (probably class C which is not ideal for IABP);
- No information about contact to balloon/contact to unloading time;
- Prevalent IABP use after PCI (86%) and not before

ESC Recommendation	Class – LoE 2017	Class – LoE 2023
IABP in STEMI-CS due to mechanical complications	IIaC	IIaC
«Routine» use of IABP in STEMI	IIIB	IIIB

Thiele et al. N Engl J Med 2012; 367:1287-1296

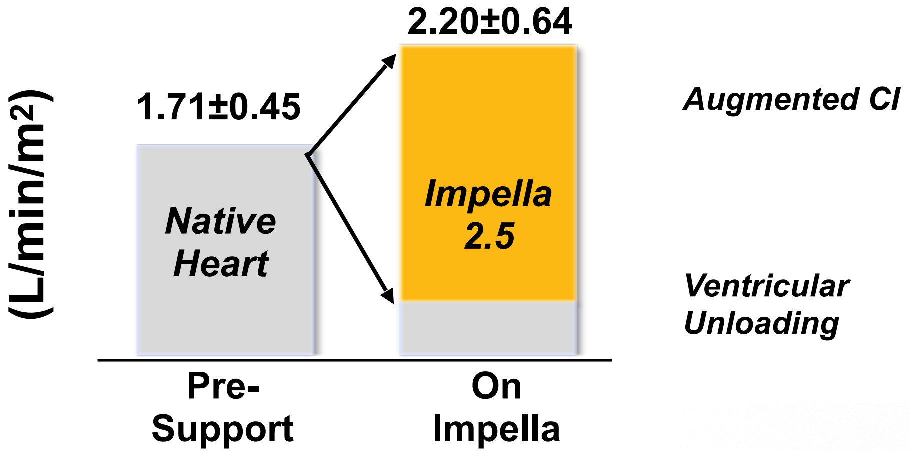
Impella is more powerful than IABP and unloads the LV

IABP



p=NS

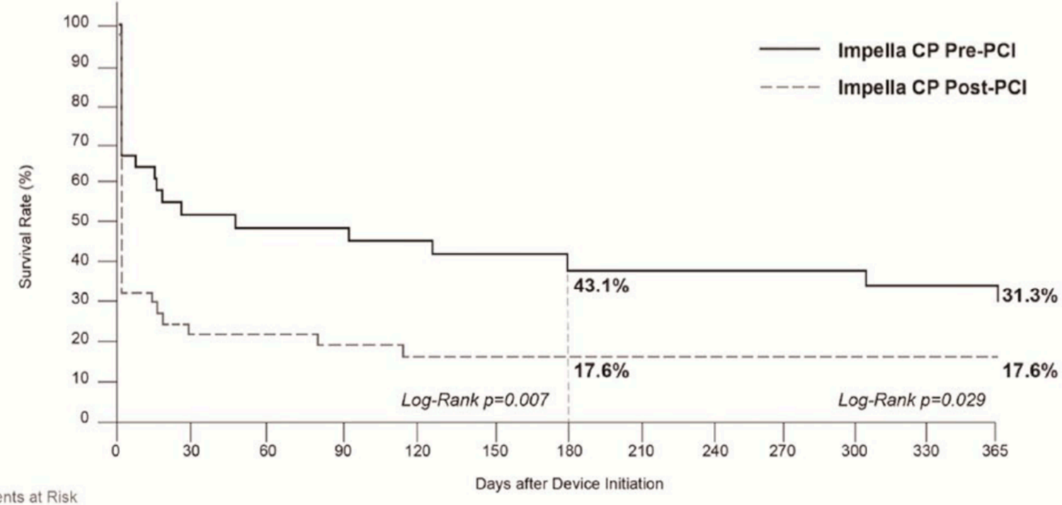
Impella 2.5



p=0.02

Seyfarth et al. – ISAR SHOCK RCT , JACC, 2008

Early Initiation of Impella Support Is Associated with Improved Outcomes in AMICS



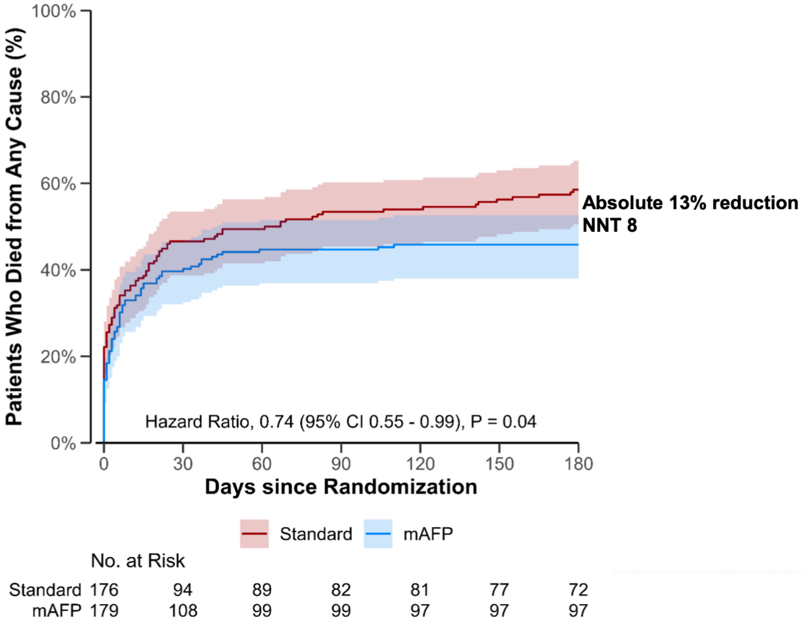
Patients at Risk

Pre-PCI group	34	17	15	15	14	13	11	10	10	10	10	9	8
Post-PCI group	39	9	9	7	6	6	6	6	6	6	6	6	6

European Heart Journal: Acute Cardiovascular Care 2020, Vol. 9(2) 149–157

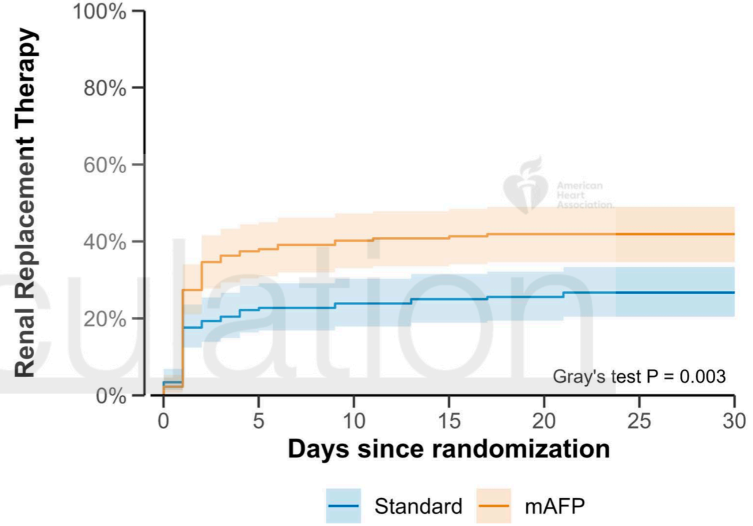
DanGer shock: selected MI-CS, early & powerful support

DanGer Shock (mAFP group, n=179)	Baseline characteristics	ECLS-Shock (ECLS group, n=209)
179 (100)	*STE-ACS – no. (%)*	135 (66)
84 (72-91)	*SBP – mmHg (IQR)*	95 (80-120)
55.9/ 28.5/ 15.6	*SCAI C / D / E class – %*	49.8 /18.2 /32.1
31.3	*3-vessel CAD – no. (%)*	30.0
25 (20-31)	*LVEF at admission – % (IQR)*	30 (20-35)
4.6 (3.4 – 7.1)	*Lactate at admission – mmol/l (IQR)*	6.8 (4.5 – 9.6)
21.8 *	*ROSC before randomization – %*	77.5
84.4	*MCS initiation before PCI – no. (%)*	21.9
4.8 (2.4 – 12.8)	*Symptoms to randomization – hr. (IQR)*	NR
11.7	*Other MCS – no. (%)*	5.8 (unloading)



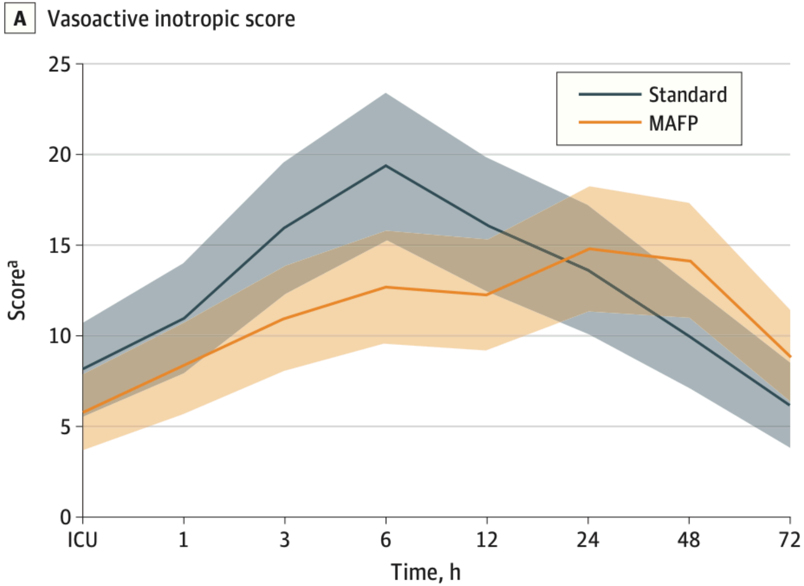
Moller et al. DanGer shock trial NEJM 2024
Tarantini et al. AJC 236 (2025) 30–33

DanGer shock: selected MI-CS, early & powerful support



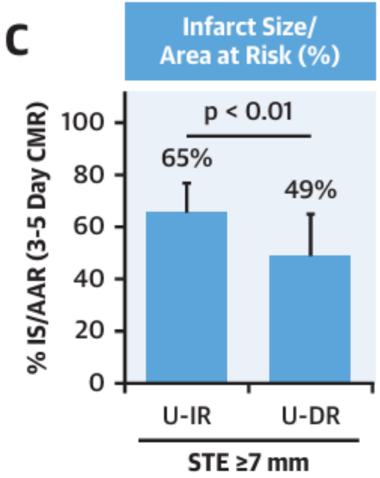
No. at Risk

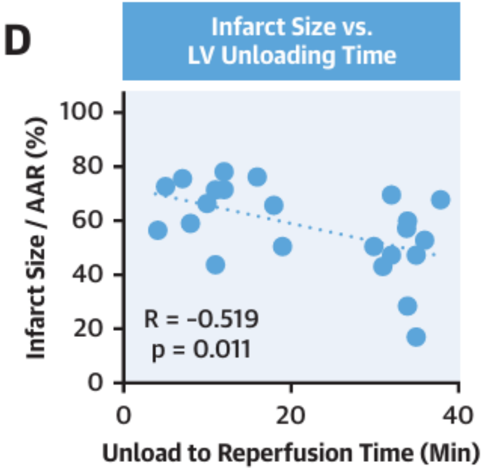
Standard	176	95	89	85	83	78	78
mAFP	179	80	72	70	68	67	67

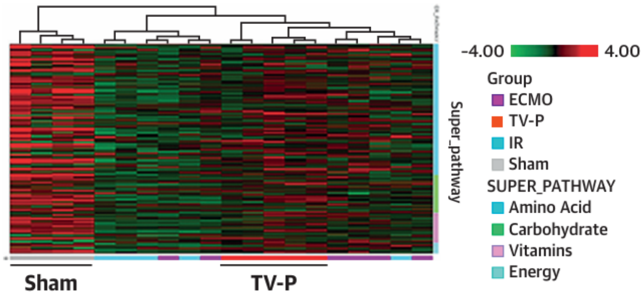


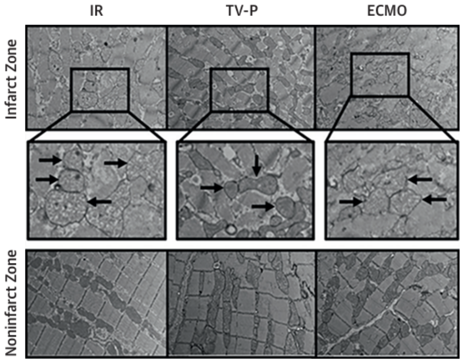
https://doi.org/10.1161/CIRCULATIONAHA.124.072370
JAMA Cardiol. doi:10.1001/jamacardio.2024.4197

Unloading before reperfusion







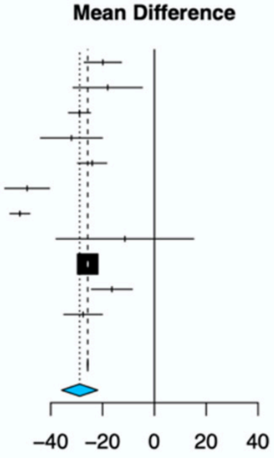


JAmCollCardiol2020;76:684–99

Unloading before reperfusion

Infarct size

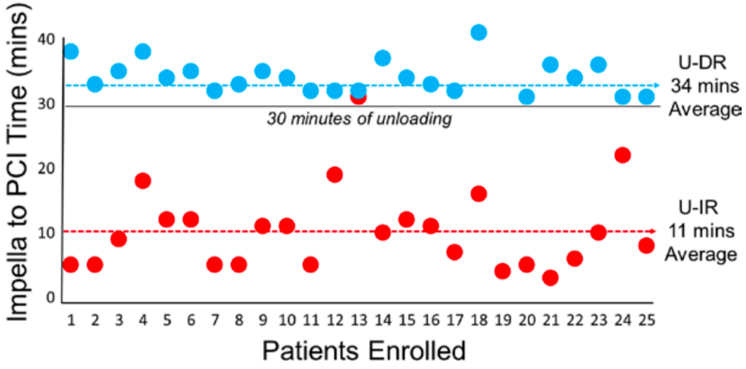
Study	1° LV unloading Total	Mean	SD	1° reperfusion Total	Mean	SD	MD	95%–CI	Weight (fixed)	Weight (random)
Achour 2005	8	34.7	4.6	8	54.6	9.2	–19.89	[–27.04; –12.74]	0.0%	9.7%
Briceno 2019	4	34.0	6.0	6	52.0	15.0	–18.00	[–31.37; –4.63]	0.0%	7.7%
Esposito 2018	6	33.3	5.0	6	62.2	1.7	–28.90	[–33.13; –24.67]	0.1%	10.4%
Kapur 2015	5	42.0	8.0	5	74.0	11.0	–32.00	[–43.92; –20.08]	0.0%	8.2%
LeDoux 2008	6	20.9	5.1	6	44.9	4.8	–24.00	[–29.60; –18.40]	0.0%	10.1%
Meyns 2003	6	18.1	10.0	8	67.2	4.6	–49.10	[–57.71; –40.49]	0.0%	9.3%
Catinella 1983	10	21.8	4.6	11	73.7	4.3	–51.90	[–55.72; –48.08]	0.1%	10.5%
Ko 2020	6	43.3	24.6	5	54.7	20.3	–11.40	[–37.93; 15.13]	0.0%	4.2%
Yoshitake 2012	6	39.7	0.1	6	65.4	0.1	–25.72	[–25.82; –25.62]	99.8%	10.8%
Sunagawa 2018	6	39.9	7.4	6	56.3	6.5	–16.40	[–24.28; –8.52]	0.0%	9.5%
Tamareille 2008	6	24.1	6.5	6	51.6	6.6	–27.49	[–34.90; –20.08]	0.0%	9.6%
Fixed effect model	**69**			**73**			**–25.74**	**[–25.84; –25.64]**	**100.0%**	**--**
Random effects model							**–28.82**	**[–35.78; –21.86]**	**--**	**100.0%**



Heterogeneity: $I^2 = 96\%$, $\tau^2 = 116.6401$, $p < 0.01$
Test for overall effect (fixed effect): $z = –503.79$ ($p = 0$)
Test for overall effect (random effects): $z = –8.12$ ($p < 0.01$)

Benenati S, et al JCM 2022

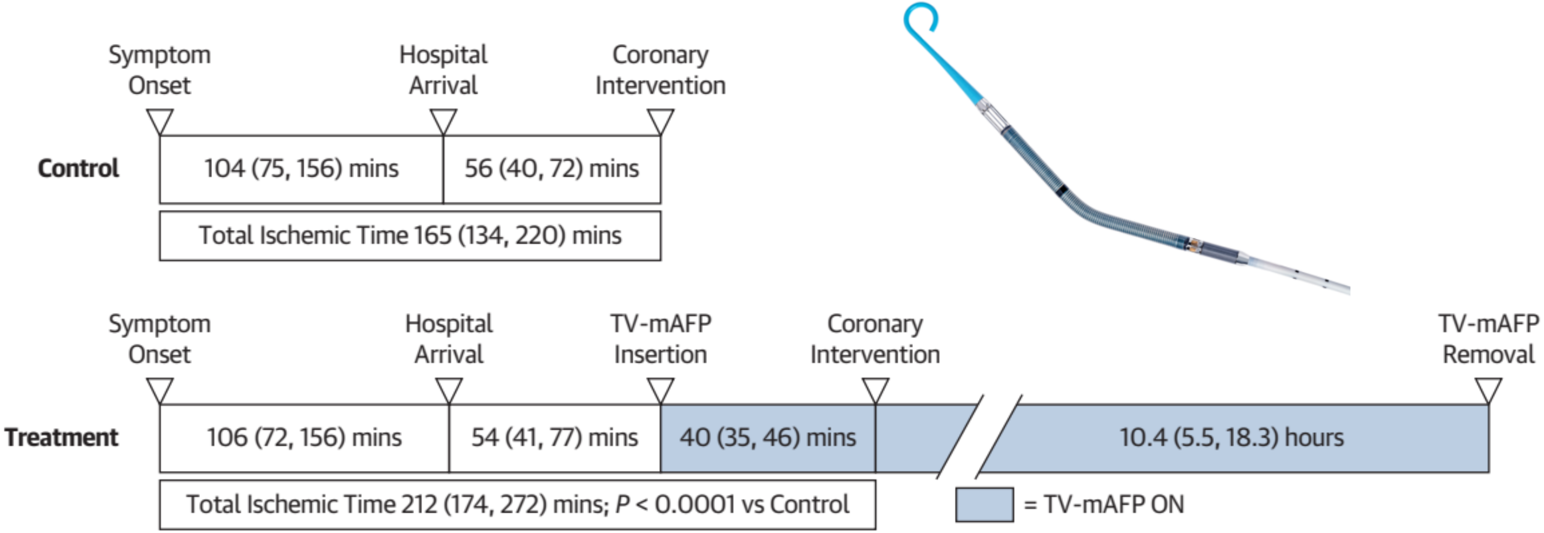
Unloading before reperfusion



Results	U-DR	U-IR	*P* Value
30 days			
Infarct size, number assessed, n (%)	21 (84.0)	19 (76.0)	
Mean (±SD), %	13.1 (11.3)	15.3 (11.5)	0.53
Median (IQR),%	10.4 (5.0–26.1)	13.0 (3.8–22.9)	
LVEF, number assessed, n (%)	21 (84.0)	19 (76.0)	
Mean (±SD), %	49.2 (12.9)	48.5 (13.4)	0.87
Median (IQR), %	47.4 (39.4–61.0)	47.2 (35.9–59.9)	
LVESV, number assessed, n (%)	20 (80.0)	19 (76.0)	
Mean (±SD), mL	76.0 (43.9)	78.3 (34.4)	0.86
Median (IQR), mL	69.0 (38.7–100.6)	65.5 (50.2–106.0)	
LVEDV, number assessed, n (%)	20 (80.0)	19 (76.0)	
Mean (±SD), mL	140.9 (50.8)	147.9 (37.1)	0.63
Median (IQR), mL	147.8 (97.8–171.6)	149.6 (119.2–171.0)	

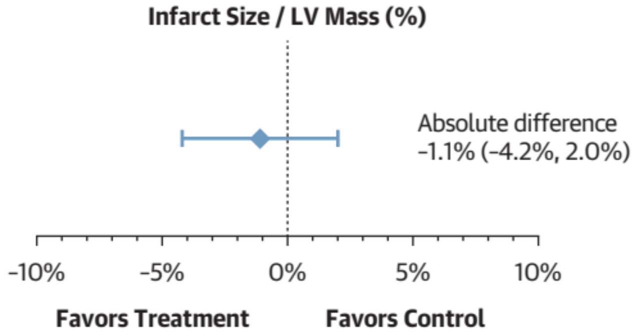
DTU-STEMI Circulation. 2019;139:337–346

Unloading before reperfusion



STEMI-DTU trial JACC 2026

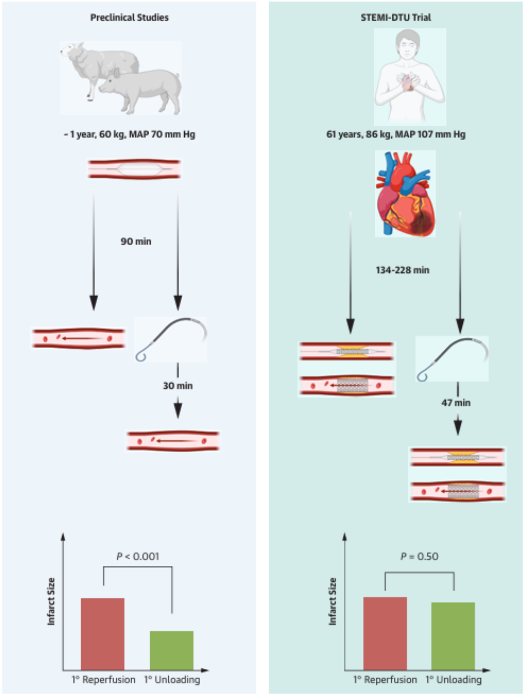
Unloading before reperfusion



Treatment Group (Prespecified Safety Population) (n = 260)	Rate n (%)	95% CI
Treatment-related (device-specific) major bleeding (BARC type 3-5) or major vascular complication (30-day)	80 (30.8)	25.2-36.8
Major bleeding (BARC type 3-5)	79 (30.4)	24.9-36.4
Total BARC type 3	79 (30.4)	24.9-36.4
BARC type 3a	40 (15.4)	11.2-20.4
BARC type 3b	39 (15.4)	10.9-19.9
BARC type 3c	0 (0)	0-1.4
BARC type 4	–	–
BARC type 5	1 (0.4)	0-2.1
Treatment-related major vascular complication	11 (4.2)	2.1-7.4

STEMI-DTU trial JACC 2026

Unloading before reperfusion



https://doi.org/10.1016/j.jacc.2026.04.012

Conclusions

- Appropriate patient, MCS and timing of intervention selection
- Unloading before reperfusion: fighting an uphill battle