Outcomes of MitraClip in Patients With Acute Mitral Regurgitation in AMI With and Without Cardiogenic Shock. IREMMI (International REgistry MitraClip in acute Myocardial Infarction)

Rodrigo Estévez-Loureiro MD PhD*,

Mony Shuvy MD, Maurizio Taramasso MD PhD, Tomas Benito-Gonzalez MD, Paolo Denti MD PhD, Dabit Arzamendi MD PhD, Marianna Adamo MD, Xavier Freixa MD PhD, Pedro Villablanca MD MSc, Lian Krivoshei MD, Neil Fam MD PhD, Konstantinos Spargias MD, Andrew Czarnecki MD, Dan Haberman MD, Yoram Agmon MD, Doron Sudarsky MD, Isaac Pascual MD PhD, Vlasis Ninios MD, Salvatore Scianna MD, Igal Moaraf MD, Davide Schiavi MD, Michael Chrissoheris MD, Ronen Beeri MD, Arthur Kerner MD, Estefanía Fernández-Peregrina MD, Mattia Di Pasquale MD, Ander Regueiro MD PhD, Lion Poles MD, Andres Iñiguez-Romo MD PhD, Felipe Fernández-Vázquez MD PhD, Francesco Maisano MD

**University Hospital Alvaro Cunqueiro, Vigo, Spain*

On behalf of IREMMI investigators

Conflict of interest

☑ I have the following potential conflicts of interest to declare:

Receipt of grants / research support: Abbott

Receipt of honoraria or consultation fees: Abbott

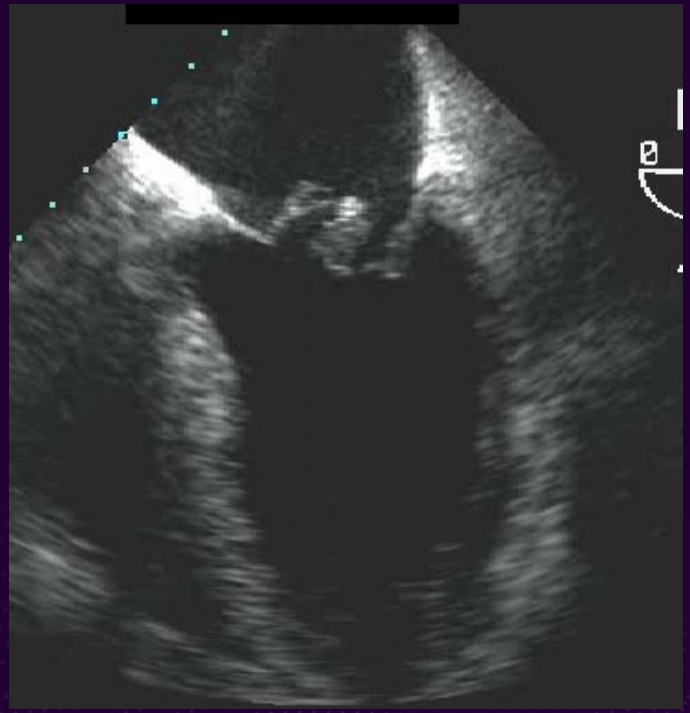
Receipt of honoraria or consultation fees: Boston Scientific

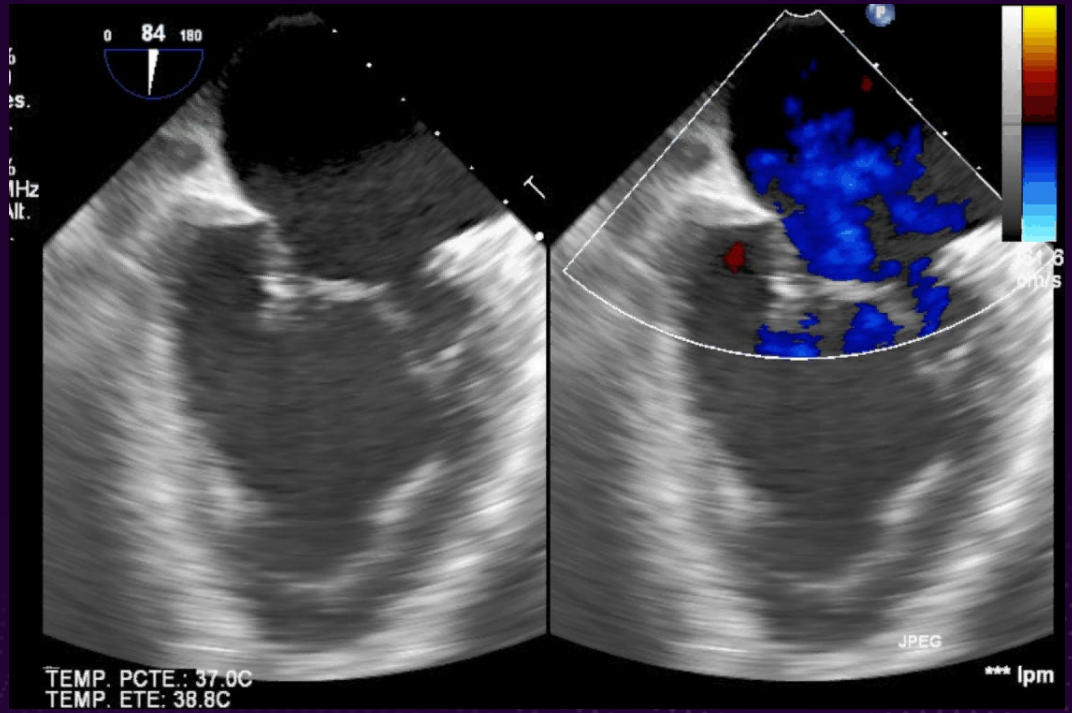
Introduction

- Severe mitral regurgitation (MR) after myocardial infarction (MI) is associated with high mortality (up to 50%)
- May account in 3% of MIs and in 10% of those presenting in cardiogenic shock
- Different causes: complete or partial papillary muscle rupture, papillary dysfunction due to LV remodeling
- Until recently surgery the only alternative

Watanabe, Heart 2019; *105:671-677*

Mechanisms postMI MR

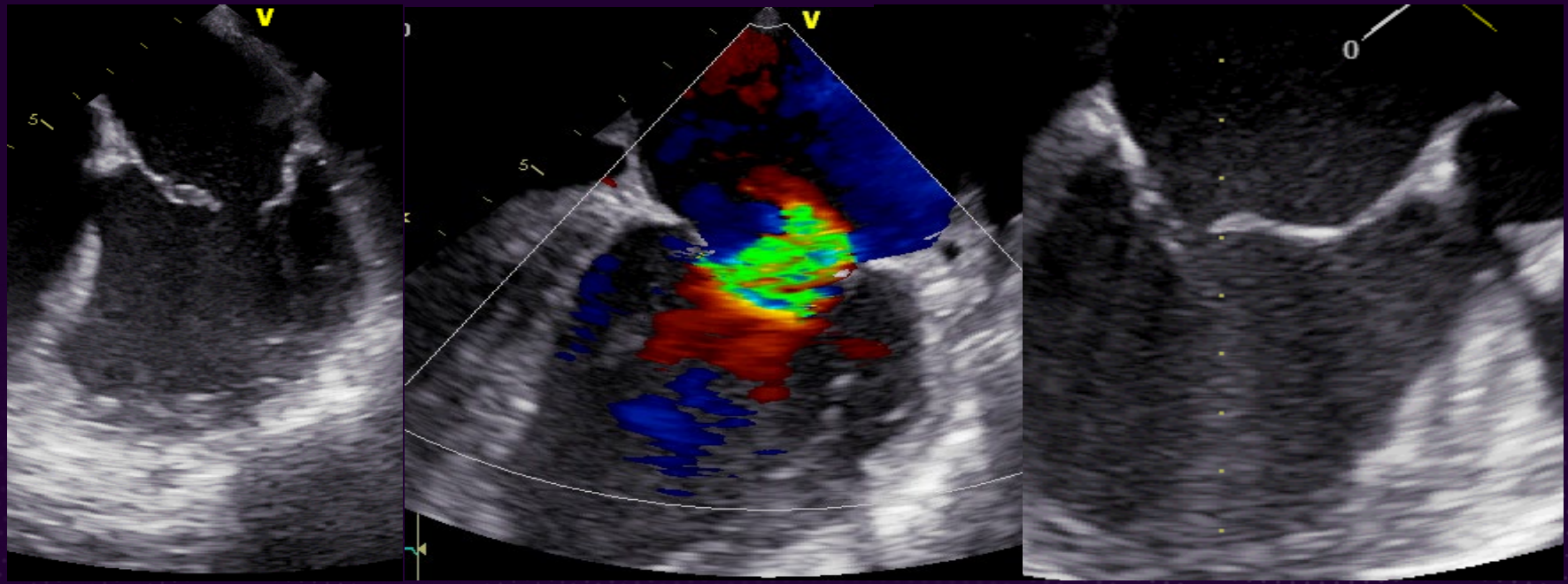




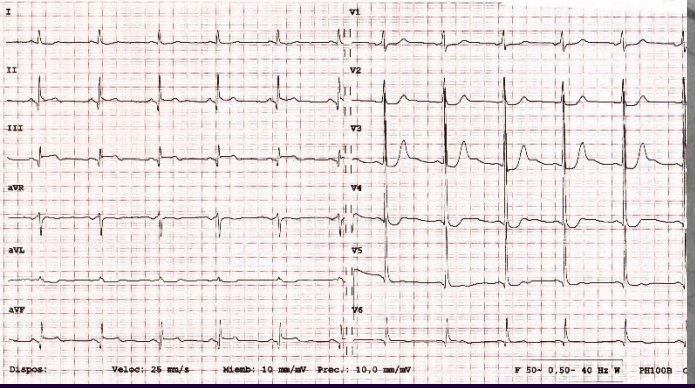
Massive PMR

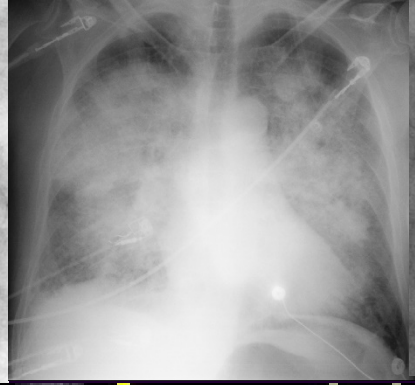
Small PMR

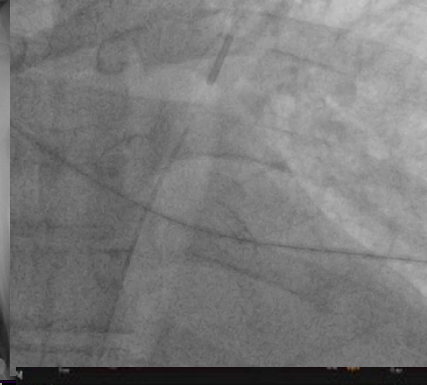
Mechanisms postMI MR



Acute LV remodeling + PML restriction


I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
Dispos:
Veloc: 25 mm/s
Miemb: 10 mm/mV
Prec.: 10,0 mm/mV
F 50- 0,50- 40 Hz W
PH100B



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Introduction

- MitraClip in acute MR after MI unfrequently analyzed
- Effect of cardiogenic shock at the time of clip on clinical and echocardiographic outcomes understudied

Aim

- To assess the clinical and echocardiographic outcomes of a cohort of patients with acute MR after MI treated by percutaneous mitral valve repair (PMVR) with MitraClip, comparing those who developed cardiogenic shock to those performed in a stable clinical setting

Methods

- Registry of all consecutive patients with acute MR following MI treated with PMVR in 18 centres from 8 countries from Europe, North America and Israel between January 2016 and March 2020
- Cardiogenic shock definition (at the time of PMVR) following SCAI recommendations (C-E)*
- Primary objective:
  - Acute procedural success
  - Clinical events: death/readmissions HF/Redo Clip or Cardiac surgery
  - Death/readmission HF main outcome during follow-up
- Secondary objectives: MR grade and NYHA functional class during available follow-up

*Jentzer J, J Am Coll Cardiol 2019;74:2117-2128

Inclusion and exclusion criteria

- Inclusion criteria
  - Acute myocardial infarction in the previous 4 weeks.
  - Symptomatic severe mitral regurgitation (3/4+) diagnosed by transthoracic echo (TTE) or transesophageal echo (TEE) following current guidelines' recommendations. Symptoms may vary form heart failure to cardiogenic shock.
  - Considered by heart team at high risk for conventional surgery.
- Exclusion criteria
  - Anatomy not suitable for MitraClip implantation (considered by local team)

Inclusion chart

	Total n = 93
University Hospital Leon	11
University Hospital of Zurich	9
Hadassah-Hebrew University Medical Center, Jerusalem	9
San Raffaele Hospital, Milano	9
Hospital Sant Pau i Santa Creu, Barcelona	9
Spedali Civili Brescia	7
Hospital Clinic, Barcelona	7
Henry Ford Hospital, Detroit	4
Kantonsspital Baden	4
Kaplan Medical Center, Rehovot	4
HYGEIA Hospital, Athens	3
St. Michael's Hospital, Toronto	3
Sunnybrook Heath Sciences centre, Toronto	3
Rambam Medical Center, Haifa	3
Padeh Medical Center, Poriya	3
Hospital Central Asturias, Oviedo	3
Hospital Alvaro Cunqueiro, Vigo	1
Interbalkan European Medical Center, Thessaloniki	1

Baseline characteristics

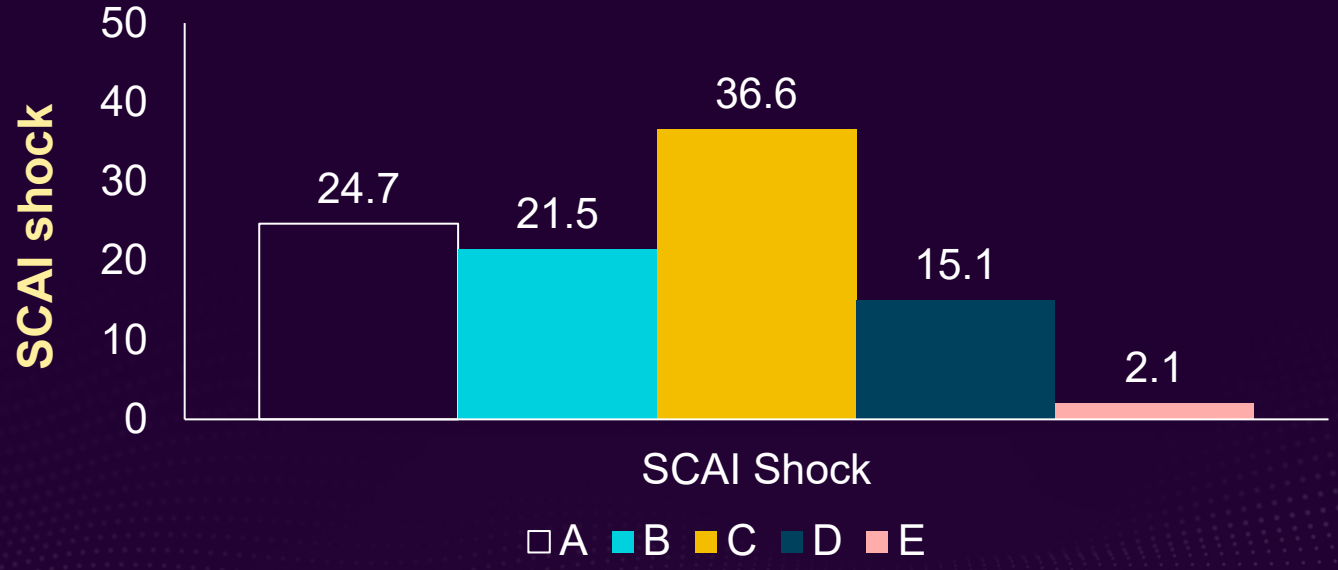
53.5% CS

	Total n = 93	CS n = 50	*NCS* n = 43	P value
Age, years	*70±10*	*68±10*	*72±9*	*0.061*
Male, n(%)	45(48)	25 (50)	20 (46)	0.836
Diabetes, n(%)	40(43)	23 (46)	17 (40)	0.672
Hypertension, n(%)	65(70)	33 (66)	32 (74)	0.486
BMI (Kg/m^2)	26±5	26±4	26±5	0.574
Dyslipidaemia, n(%)	58(62)	28 (56)	30 (69)	0.192
COPD, n(%)	16(17)	7 (14)	9 (21)	0.417
Previous IHD, n(%)	53 (57)	28 (56)	25 (58)	1.000
Previous stroke n(%)	13(14)	9(18)	4 (9)	0.368
Previous CABG n(%)	25(27)	14 (28)	11 (25)	0.817
Previous CKD, n(%)	*45(48)*	*20 (40)*	*25 (58)*	*0.081*
Euroscore 2, mean±SD	*16±15*	*21±18*	*11±8*	*0.001*

Baseline characteristics (ii)

	Total n = 93	CS n = 50	*NCS* n = 43	P value
Infarct location, n(%)				*0.013*
Anterior	*32(35)*	*23 (46)*	*9 (21)*	
Inferior	44(47)	16 (32)	28 (65)	
Lateral	15(16)	10 (20)	5 (12)	
Undetermined	2(2)	1 (2)	1 (2)	
STEMI, n (%)	68(73.1)	39 (78)	29 (67.4)	0.502
Multivessel disease, n(%)	73(78)	38(76)	36 (83)	0.404
Primary PCI, n (%)	66(71)	38 (76)	28 (65)	0.159
MCS, n (%)				
IABP/Impella	36(38)	33 (66)	3(7)	<0.001
VA ECMO	6(6)	6 (12)	0 (0)	0.028
Vasoactive drugs, n(%)	43(46)	41 (82)	2 (4)	<0.001

SCAI shock



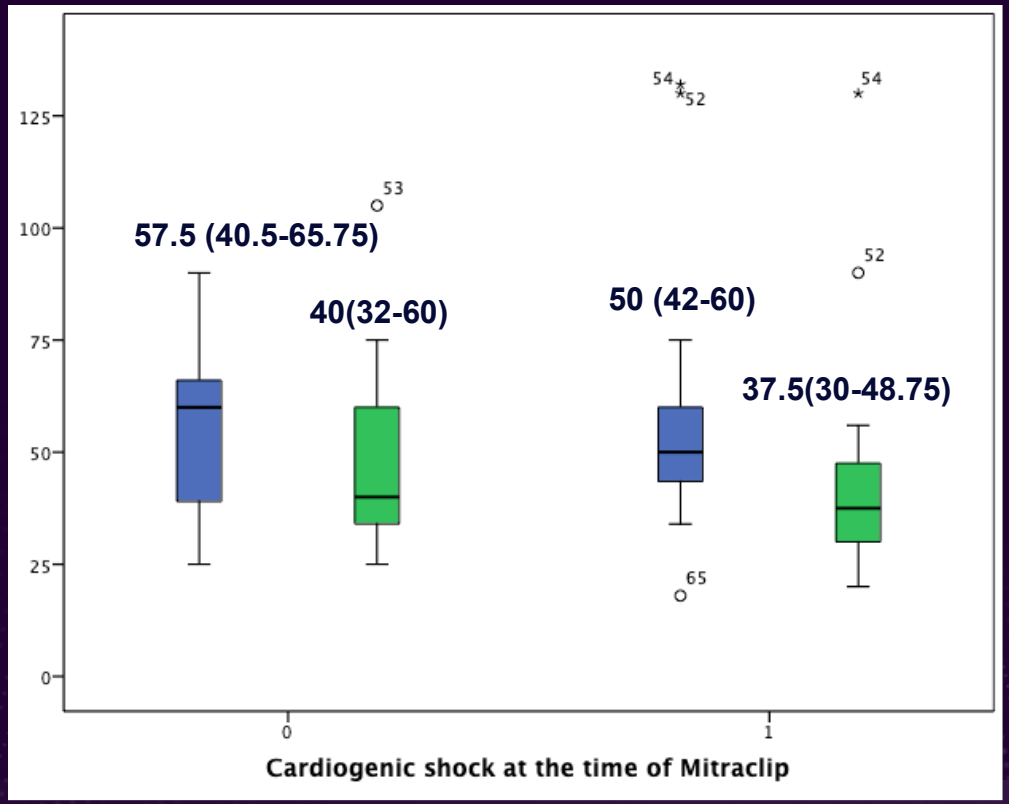
Baseline echo

	CS n = 50	*NCS* n=43	P value
EDD (mm)	57.4±10	57.1±12	0.937
LVEF (%)	***34±12***	***38±11***	***0.079***
MR grade 4+, n(%)	43 (86)	34 (79)	0.377
Systolic PAP (mmHg)	53±21	55±18	0.793
TR grade	***1.6±0.8***	***1.2±0.8***	***0.098***
TAPSE (mm)	14.5±2.1	18.3±2.6	0.111

Procedural characteristics

	CS n = 50	*NCS* n=43	P value
Time MI-Clip, days	***24±22***	***33± 23***	***0.069***
Technical success	***100%***	***100%***	***1.000***
Acute Procedural Success	***90%***	***93%***	***0.793***
Number of clips	1.6±0.68	1.7±0.67	0.667
Type of clip			
- NT/NTR	88%	83%	
- XTR	8%	14%	0.326
- Combination	4%	3%	
Mitral gradient Post, mmHg	3.7±1.9	3.6±1.7	0.741
Major complications (partial clip detachment, air embolism, myocardial infarction, stroke, vascular injury, pericardial effusion and bleeding events)	4%	7%	0.659
Procedural time, min	***143±113***	***83±44***	***0.003***

Significant decrease in SPAP post-procedure



P<0.0001

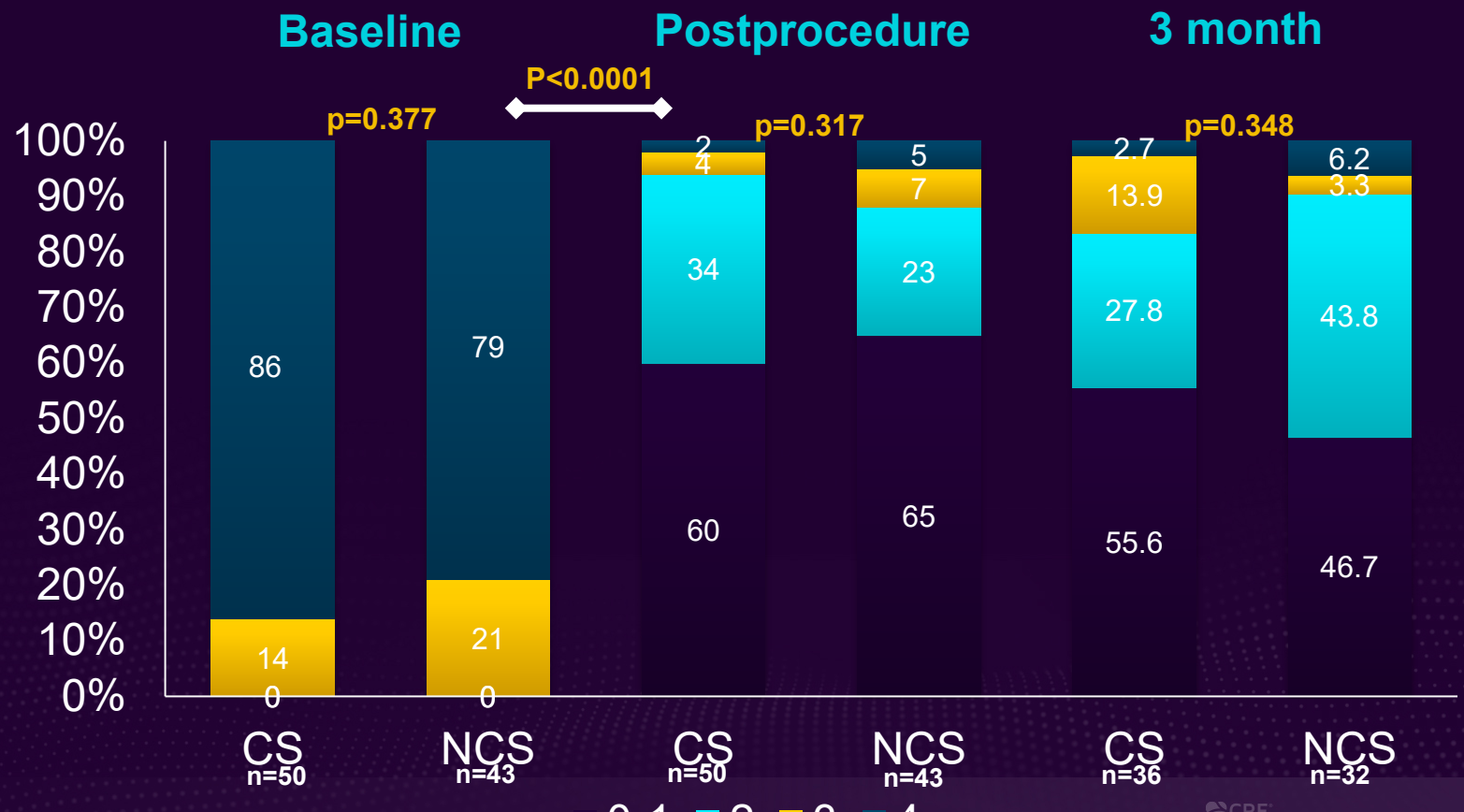
Clinical events 30 days

	Total n = 93	CS n = 50	*NCS* n=43	P value
All-cause mortality	6.5%	10%	2.3%	0.212

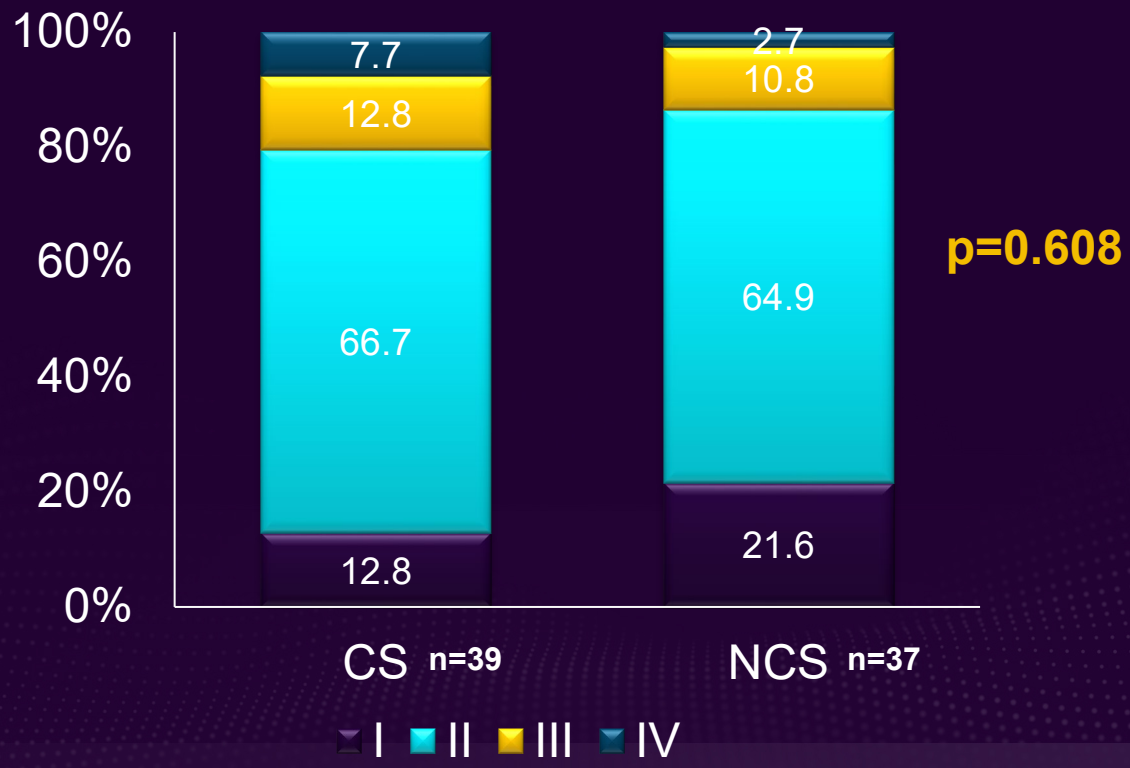
Clinical events 3 months

	Total n = 93	CS n = 50	*NCS* n=43	P value
All-cause mortality	7.5%	12%	2.3%	0.118
Readmission due to HF	18%	13%	23%	0.253
Redo Clip or Surgery	4.3%	6%	2.3%	0.621

MR reduction 3 months



NYHA functional class 3 months



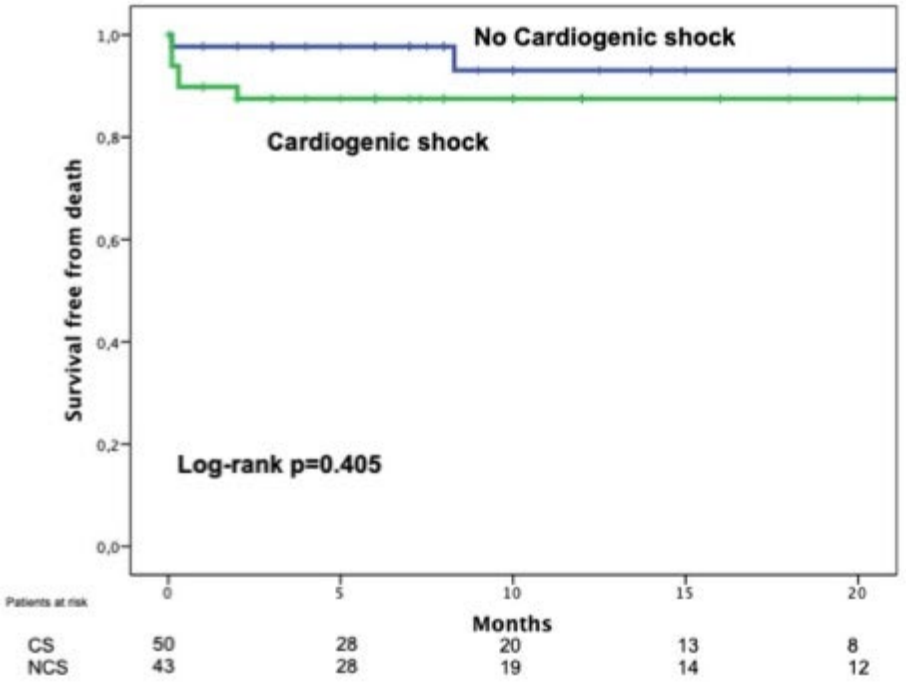
Mortality and HF rehosp at follow-up

Median follow-up 7 months (IQR 2.5-17)

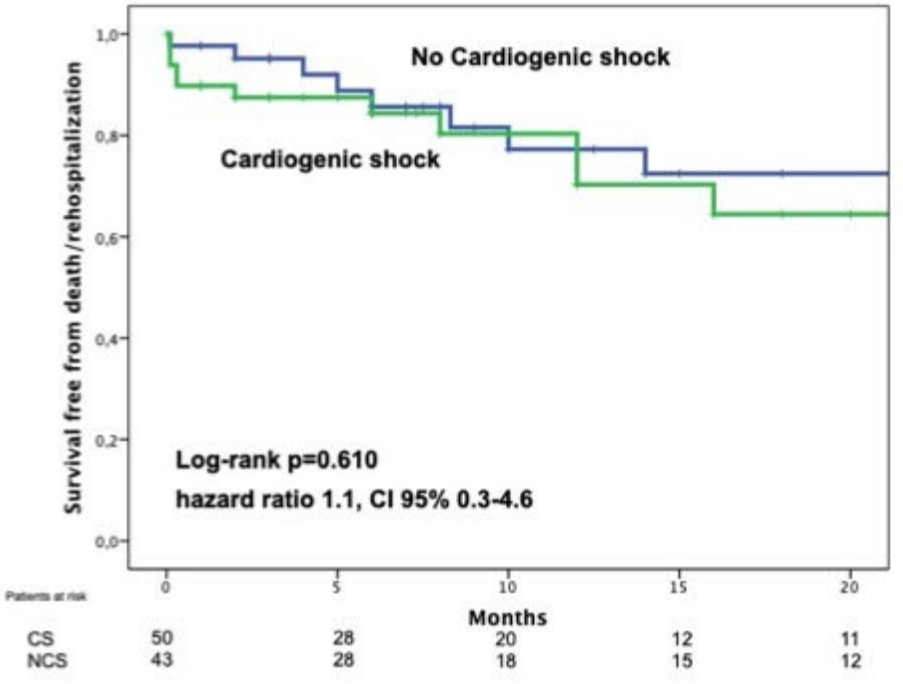
	CS n = 50	*NCS* n=43	P value
All-cause mortality	16%	9.3%	0.377
Combined death/rehospitalization due to HF	28%	25.6%	0.793

Survival

Death



Death/rehospitalization HF



Median follow-up 7 months
(IQR 2.5-17 month, range 0-81 month)

Cox-regression analysis: death/readmission HF

	Univariate			Multivariate		
	HR	*CI95%*	P value	HR	*CI95%*	P value
Age	0.99	0.95-1.03	0.651	1.05	0.97-1.13	0.227
CKD	1.11	0.48-2.60	0.810			
DM	1.90	0.81-4.46	0.140			
EuroScore II	1.02	0.99-1.05	0.087	1.02	0.99-1.06	0.154
Pre IHD	0.98	0.38-2.56	0.979			
LVEF	0.99	0.95-1.03	0.592			
Cardiogenic shock	0.97	0.42-2.24	0.936	1.1	0.3-4.6	0.889
Procedural success	***0.18***	***0.06-0.57***	***0.004***	***0.10***	***0.02-0.60***	***0.012***
MCS	0.60	0.23-1.54	0.288			

Limitations

- Registry
- Small sample size
- Lack ECL
- Highly experienced teams

Conclusions

- In this very high-risk population, PMVR with MitraClip appears to be a safe and effective alternative for correcting MR and improving patients clinical profile
- CS, when adequately supported, does not seem to influence short and mid-term outcomes
- The development of CS should not preclude PMVR in this scenario
- Main determinant for clinical outcomes is procedural success: anatomic selection and team experience