



Allegheny
Health Network

Cardiogenic Shock In TAVR
How do I bridge to TAVR/SAVR

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My Disclosures

Consultant , Proctor MDT and Edward Life Science
Speaker's Bureau: AstrZeneca

Introduction

AS and CS carries a high mortality.

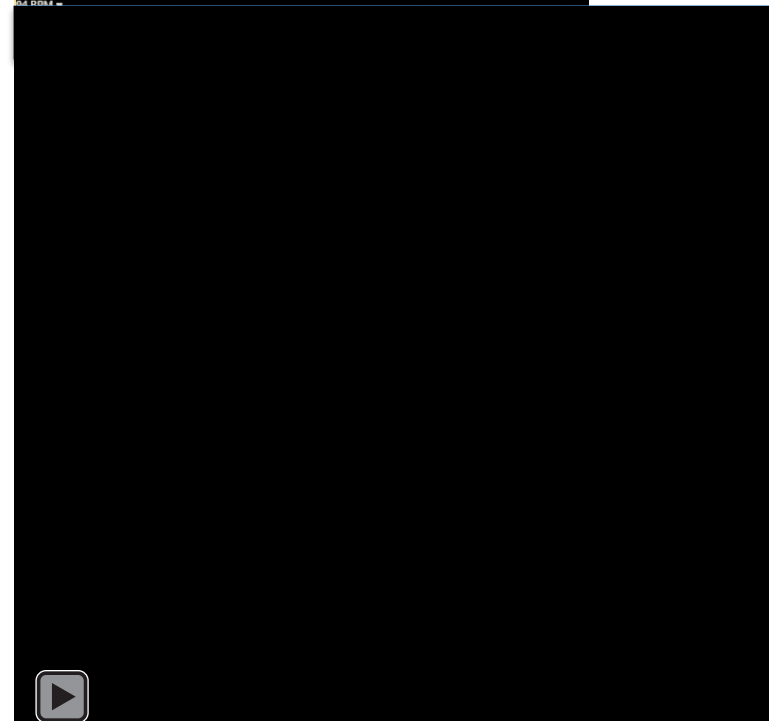
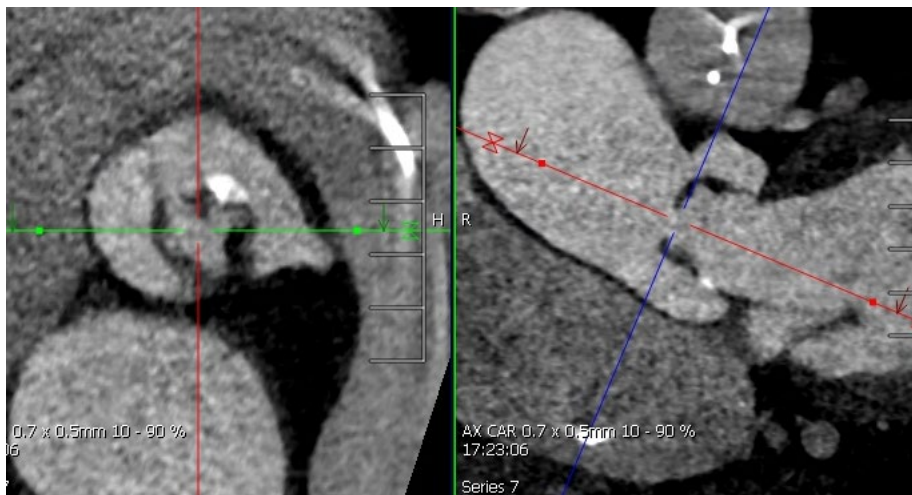
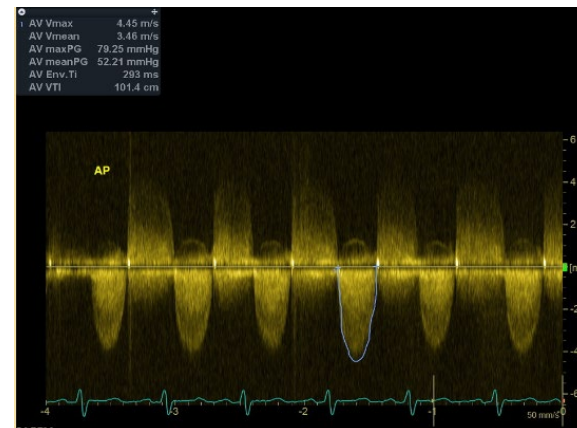
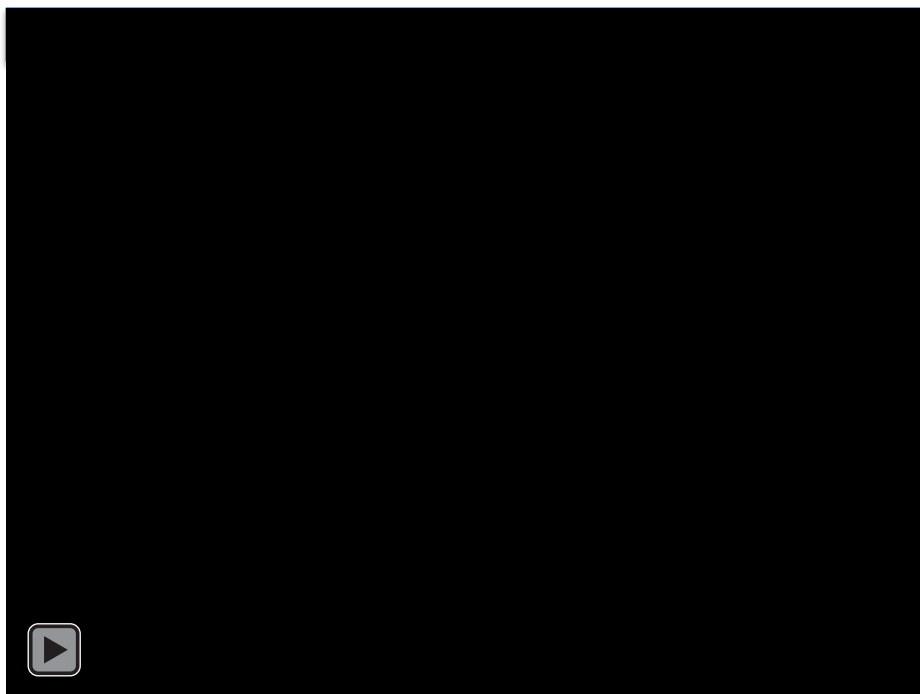
AS-CS excluded from TAVR trials even Partner B trial (inoperable):

Exclusion: Hemodynamic instability requiring inotropic therapy or mechanical hemodynamic support devices

EF < 20%

Despite earlier referrals, AS and Cardiogenic Shock is still prevalent. 3%

57 yo female ? Unicuspid Severe AS



Balloon aortic valvuloplasty (BAV) reported a 30d 1y,2y mortality of 40% 70% and 90%

Only 27% underwent TAVR(10/44) or SAVR(2/44)

Better outcome if BAV <48 hours of initiation of pressors

EuroIntervention 2018;14:e519–e525

BAV or TAVR have similar rates of in-hospital mortality (2.9% versus 3.5%; P=0.60), stroke (1.6% versus 3.1%; P=0.10), and vascular complications (8.2% versus 10.9%; P=0.14)-Propensity matched-NIS 2004-2013

Highest OR for death was CS(OR=6) and need MCS/IABP(OR=3.48)

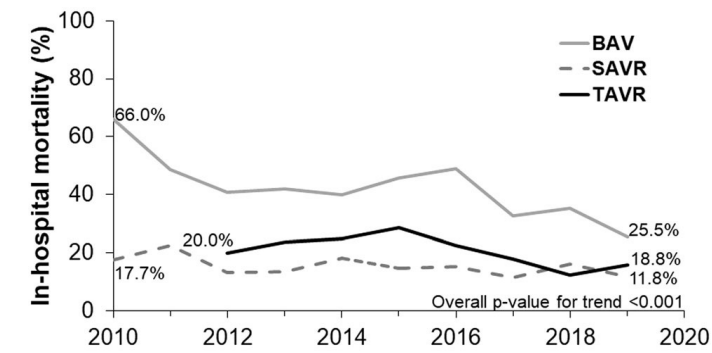
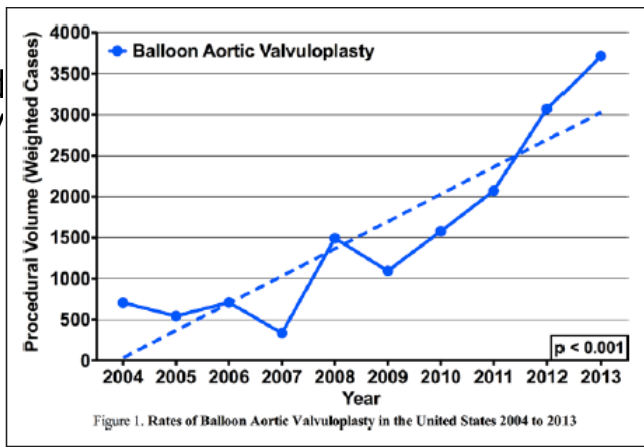
Circ Cardiovasc Interv. 2017;10:e004481

Role of BAV in AS-CS

May offer benefit in non cardiac illness (Sepsis-Trauma-TAVR prohibitive-**Buy time**)

In multiple competing entities (VHD,CAD,Arrythmia): therapeutic and diagnostic wether correcting AS is sufficient (**Proof of concept**)

To determine TAVR futility-**Triage CCI september 2022**



# evaluated	Year										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
TAVR	64	110	110	205	240	300	325	400			
BAV	47	113	110	190	175	240	250	275	325	275	
SAVR	510	740	600	665	715	720	650	480	555	510	

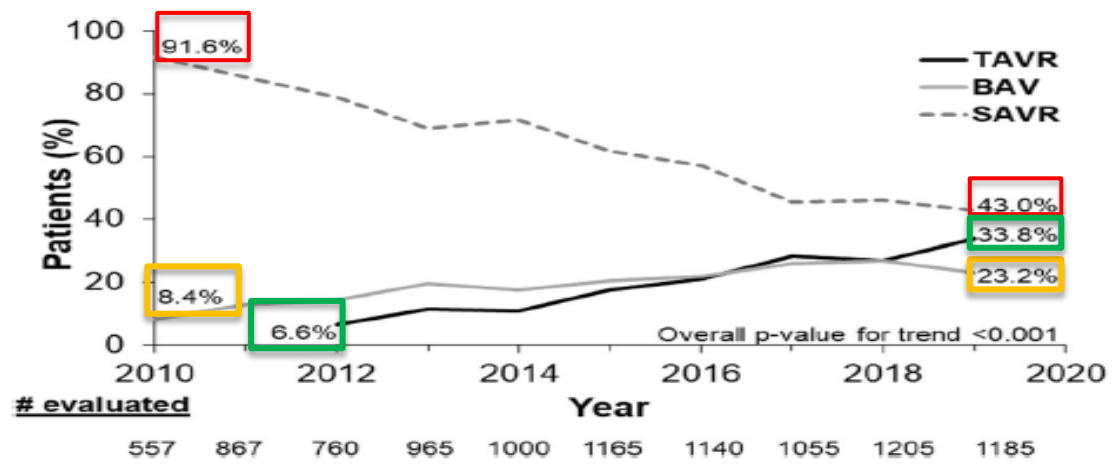


FIGURE 1 Use of invasive treatments over time in patients hospitalized for severe aortic stenosis and cardiogenic shock. p Value

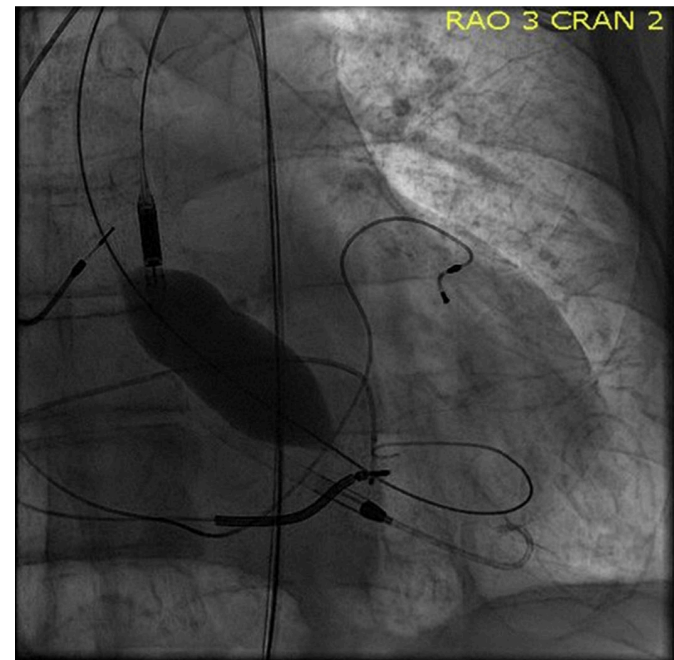
BAV as a Bridge

Re-defined

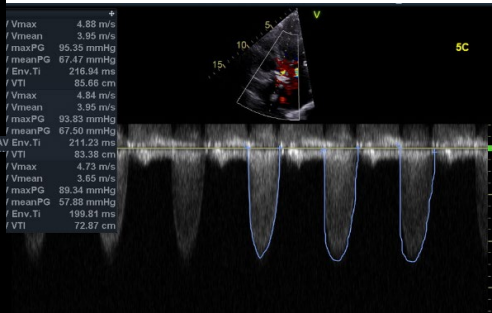
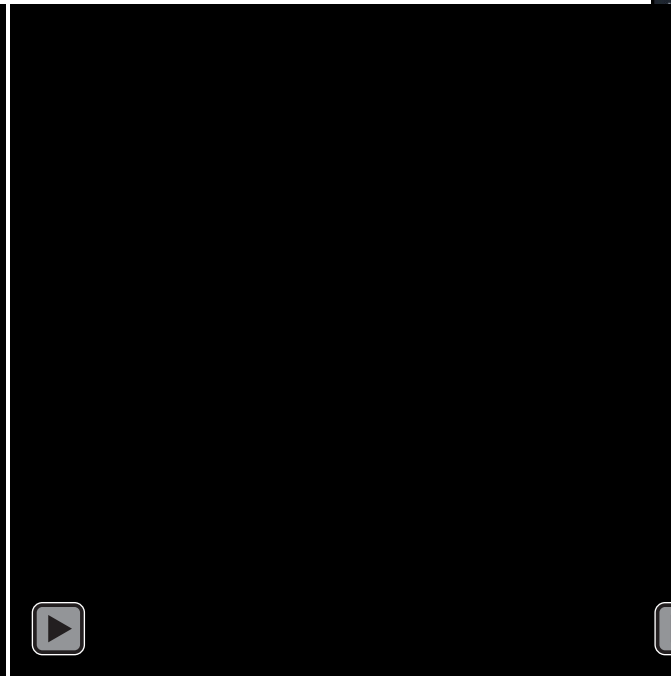
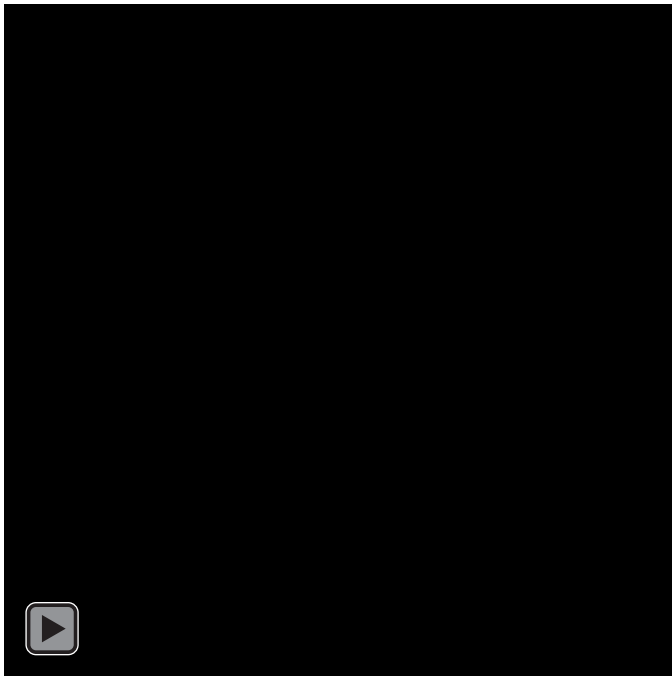
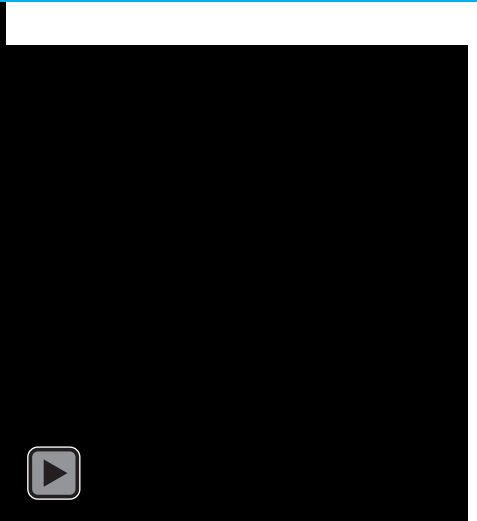
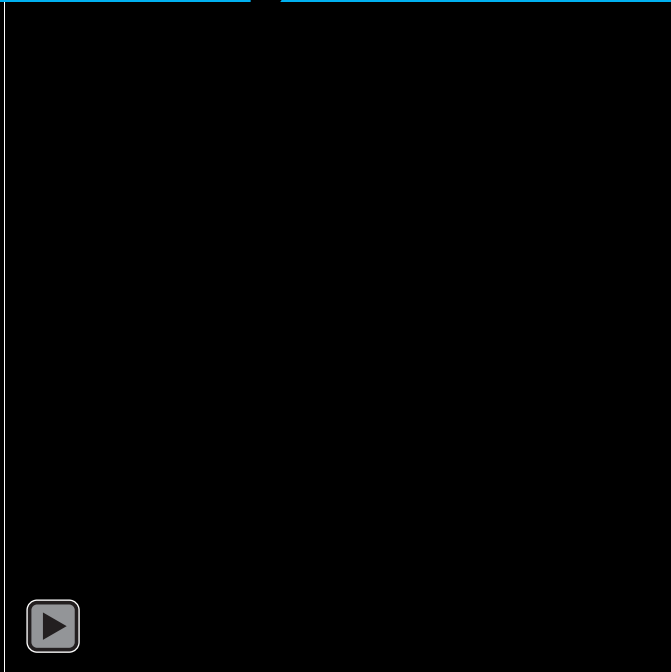
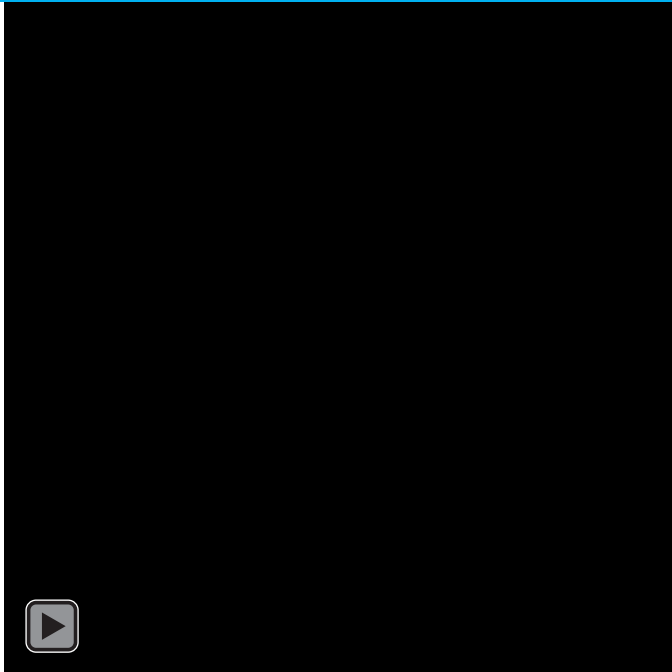
If option between BAV Vs TAVR in CS→TAVR

If no option for TAVR-BAV awaiting TAVR

BAV assisted MCS



BAV during CPR



MCS as bridge to TAVR

NIS (Assuming tMCS needed for CS)
2012-2018

N~216,000. MCS=3100(1.4%)

IABP 49%-ECMO27% pVAD 18%-7.1% >1

Mortality OR=23

\$84,600 versus \$48,100

LOS 9days Vs 3 days

Mortality MCS before 24 hrs TAVR 10.7%-During TAVR 31%
Post TAVR 68%

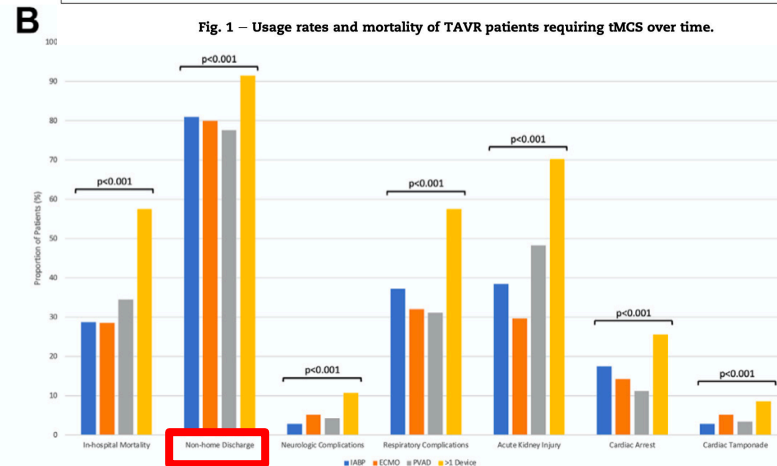
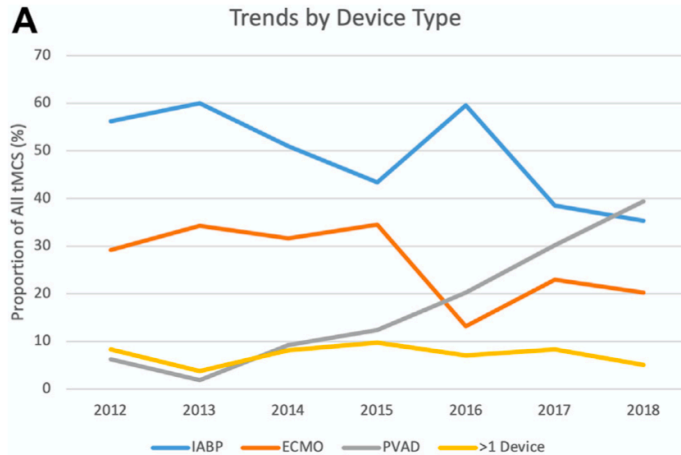
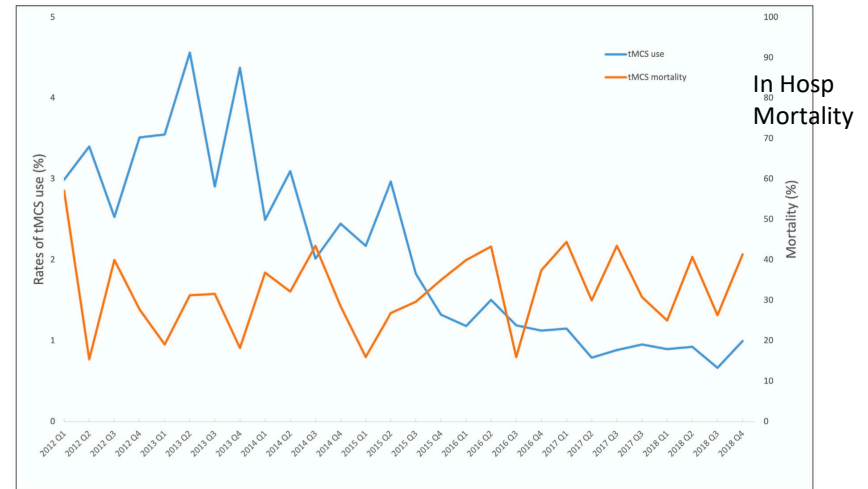


Fig. 2 – (A) Usage trends by device type; P-trend < 0.01 for all curves. (B) Outcomes of patients requiring tMCS, subdivided into device type. tMCS = temporary mechanical circulatory support; IABP = intra-aortic balloon pump; ECMO = venoarterial extracorporeal membrane; PVAD = percutaneous ventricular assist device.

MCS Bridge to SAVR

Very few papers comparing TAVR to SAVR in CS

Emory's experience -2005-2018

Emergent TAVR Vs SAVR

Similar 30d and 1 year MR TAVR-SAVR 5-10% and 25-50%

MCS 10%

IABP 20%

Pressors-Inotropes

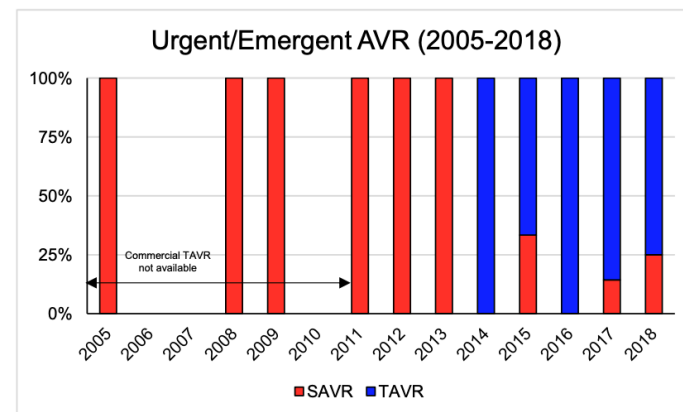
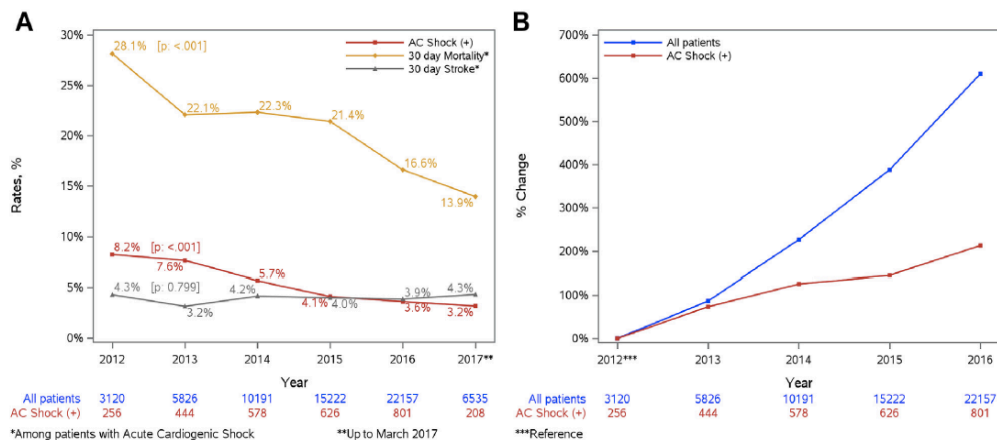


Fig. 3. Yearly procedure breakdown – TAVR vs. SAVR. Change over time in the number of SAVR compared with TAVR. TAVR = transcatheter aortic valve replacement; SAVR = surgical aortic valve replacement.

Demographics, Procedural Characteristics, and Clinical Outcomes When Cardiogenic Shock Precedes TAVR in the United States

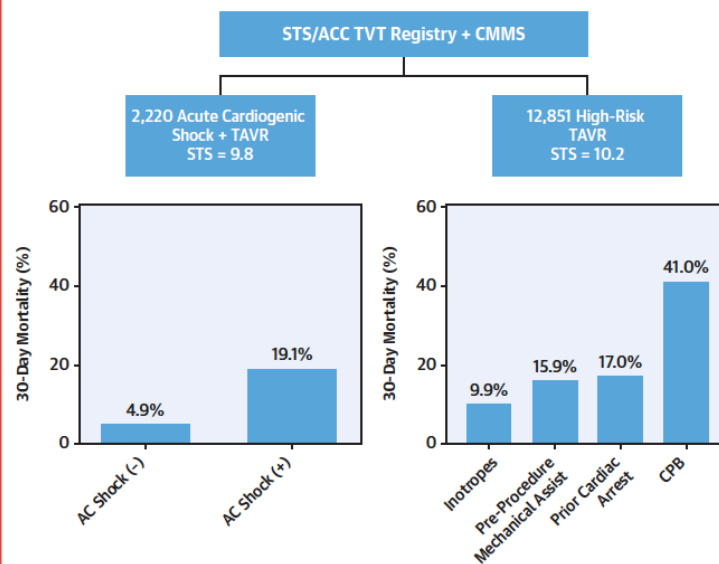
Luke Masha, MD, MPH,^a Sreekanth Vemulapalli, MD,^b Pratik Manandhar, MS,^c Prakash Balan, MD,^d Pinak Shah, MD,^e Andrzej S. Kosinski, PhD,^c Garrick Stewart, MD^e

FIGURE 1 Cardiogenic Shock Populational Changes and Changes in Mortality/Stroke Frequencies Across Time



(A) Frequencies of acute cardiogenic (AC) shock among all U.S. patients undergoing transcatheter aortic valve replacement (TAVR) across time, as well as frequencies of 30-day death and 30-day stroke in the cardiogenic shock population undergoing TAVR. (B) Percent change in size of the total U.S. TAVR population and total U.S. TAVR population presenting with cardiogenic shock relative to these same populations in 2012.

CENTRAL ILLUSTRATION Crude 30-Day Mortality Rates Classified by Shock Status

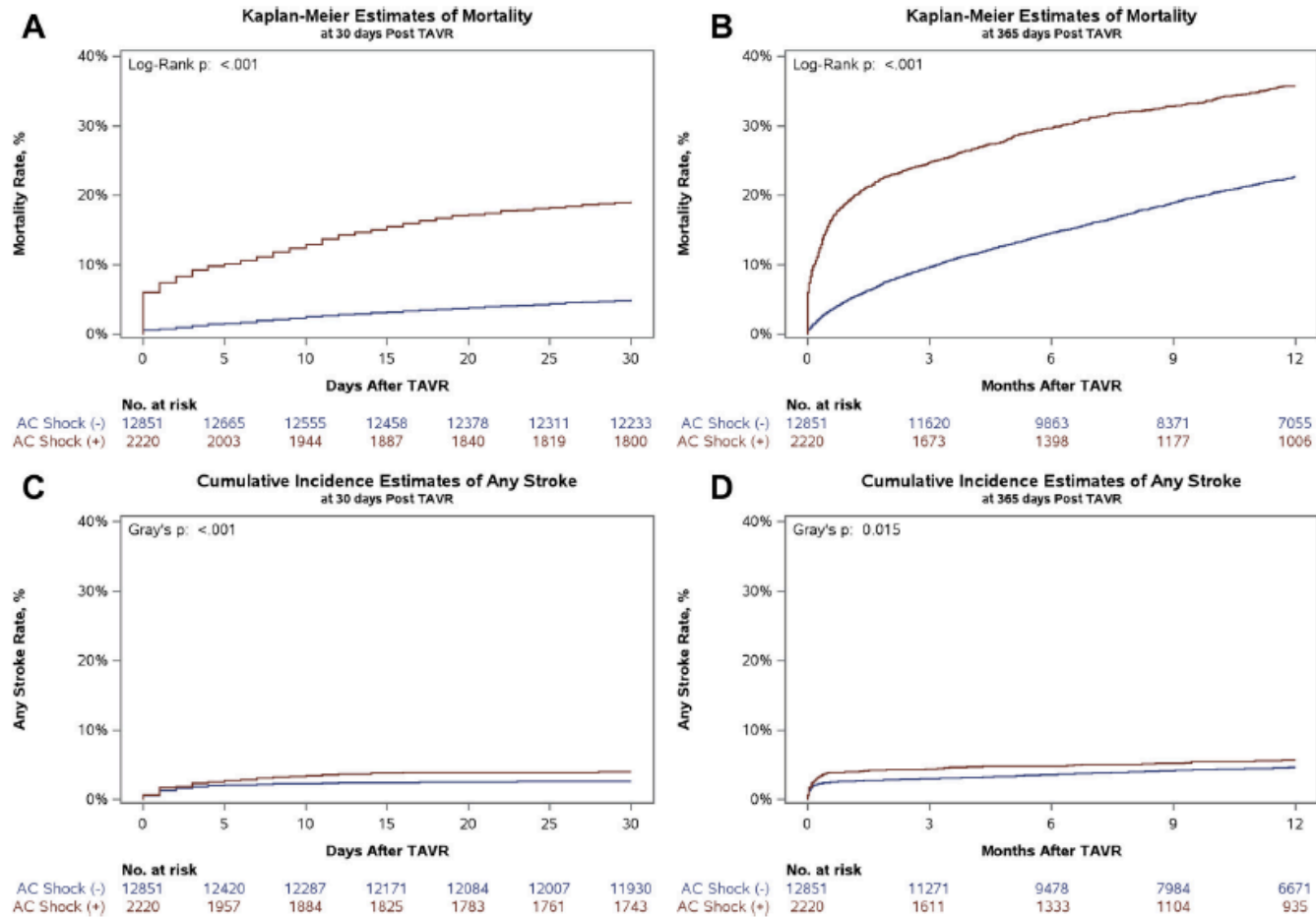


Masha, L. et al. J Am Coll Cardiol Intv. 2020;13(11):1314-25.

Crude 30-day mortality rates for shock versus nonshock patients as well as shock subgroups. AC = acute cardiogenic; CMMS = Centers for Medicare & Medicaid Services; CPB = cardiopulmonary bypass; STS/ACC TVT = Society of Thoracic Surgeons and the American College of Cardiology Transcatheter Valve Therapy registry; TAVR = transcatheter aortic valve replacement.

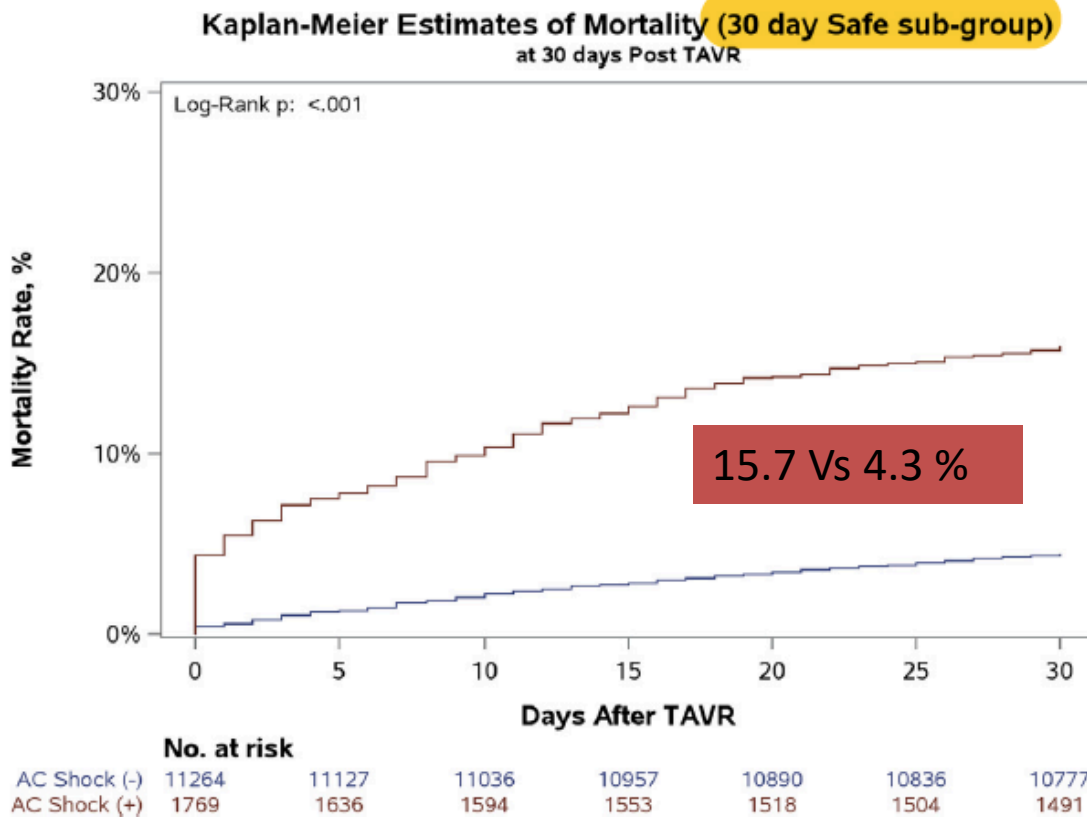
Trends towards decrease Mortality in TAVR Shock
28% → 14%

FIGURE 2 Mortality and Stroke Estimates at 30 Days and 365 Days Classified by Shock Status



Kaplan-Meier curves for 30-day and 1-year mortality and stroke for TAVR patients with acute cardiogenic shock and control high-risk patients without acute cardiogenic shock (A to D). Abbreviations as in Figure 1.


FIGURE 3 Mortality Estimates in Patients With Uncomplicated Procedures Classified by Shock Status



Excluding Procedural complication
Mortality unchanged

Kaplan-Meier curves for 30-day mortality patients in both groups that met modified **VARC-2 early safety criteria**. 30-day mortality for patients presenting with cardiogenic shock with uncomplicated procedures was 16%. VARC-2 = Valve Academic Research Consortium-2; other abbreviations as in [Figure 1](#).

Outcomes of transcatheter aortic valve replacement in patients with cardiogenic shock

Kashish Goel¹, Pinak Shah², Brandon M. Jones³, Ethan Korngold³, Anju Bhardwaj⁴, Biswajit Kar⁴, Colin Barker¹, Molly Szerlip⁵, Richard Smalling⁴, and Abhijeet Dhoble ^{4*}

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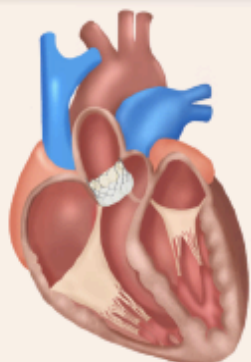
Received 13 April 2023; revised 25 May 2023; accepted 29 May 2023

- TAVRs performed for CS 6/15- 9/22 and
- SAPIEN 3 and SAPIEN 3 Ultra-TVT
- CS
 - coding of CS within 24 h on Transcatheter Valve Therapy Registry form
 - and/or pre-procedural use of inotropes or mechanical circulatory support devices
 - and/or cardiac arrest within 24 h prior to TAVR

Outcomes of cardiogenic shock patients undergoing TAVR

Mean STS score: 10.76 ± 10.4 , mean age: 75.56 ± 11.03 years for cardiogenic shock group

STS/ACC TVT registry



Total population
n=309 505

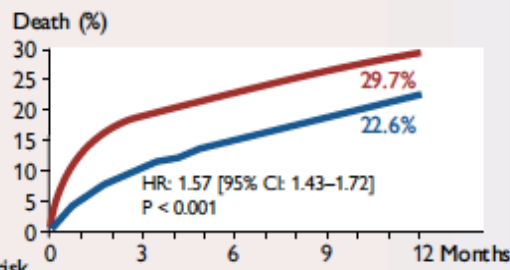
Cardiogenic shock
n=5006

No cardiogenic shock
n=304 499

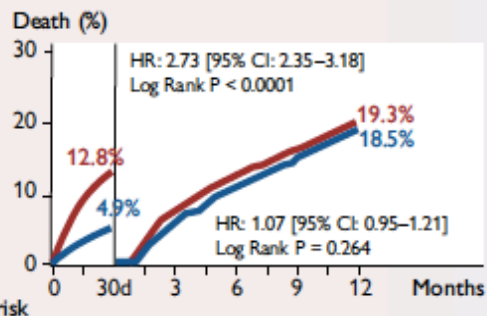


Adjusted mortality and landmark analysis

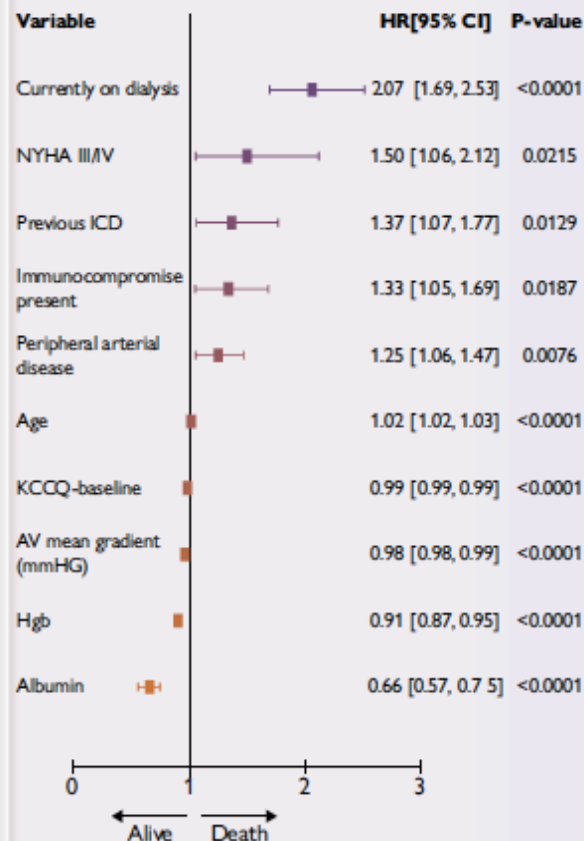
— Cardiogenic Shock — No Cardiogenic Shock



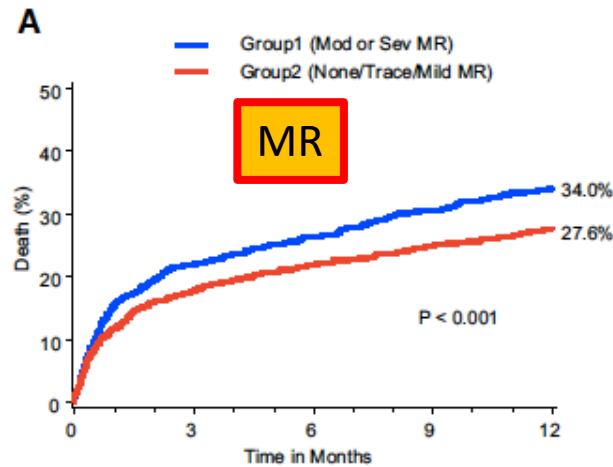
— Cardiogenic Shock — No Cardiogenic Shock



Predictors of 1-year mortality

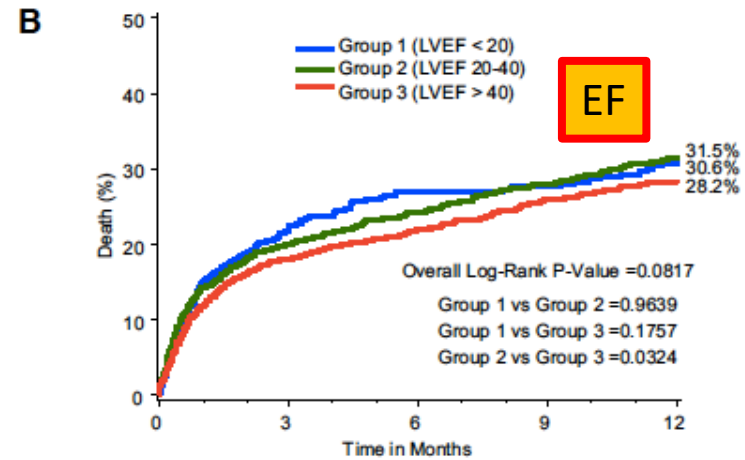


After adjusting baseline characteristics-



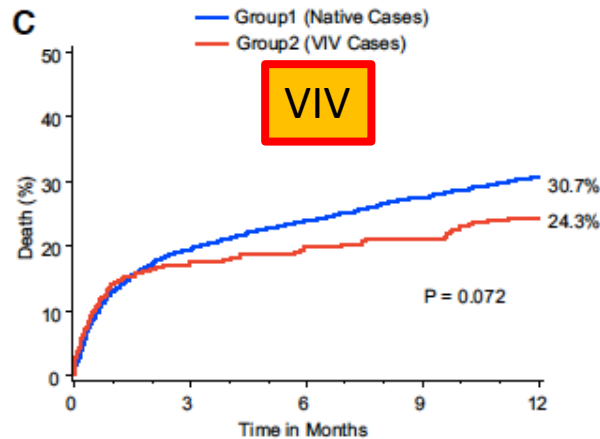
Number at risk:

Group1	1954	945	872	814	556
Group2	2369	1164	1089	1039	732



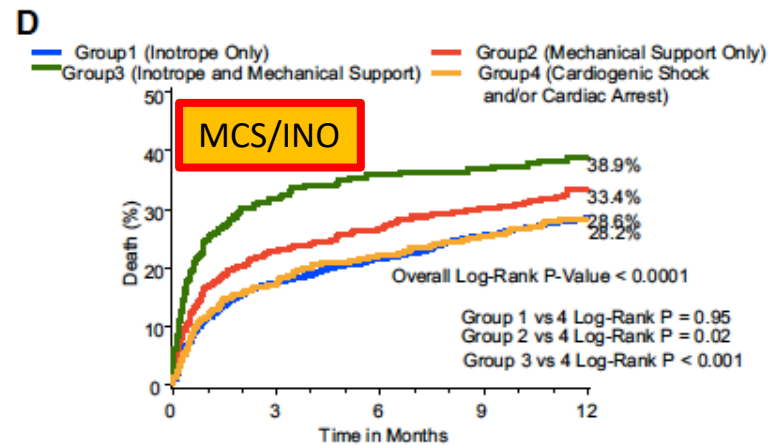
Number at risk:

Group 1	563	266	247	239	168
Group 2	2,186	1,036	958	905	637
Group 3	2,226	1,100	1,029	970	667



Number at risk:

Group1	4405	2129	1975	1862	1291
Group2	601	288	274	265	190

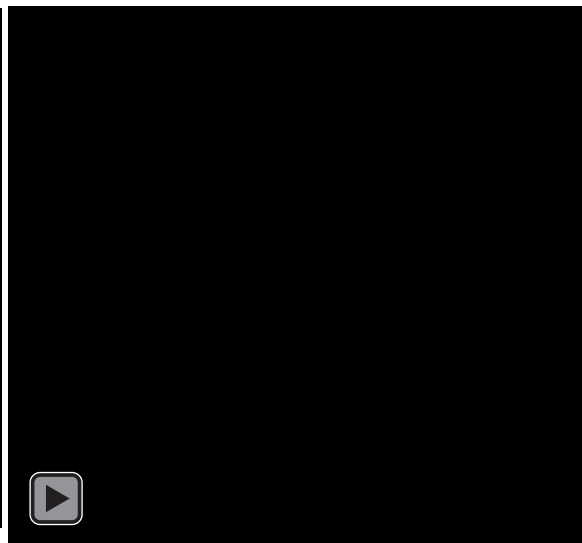
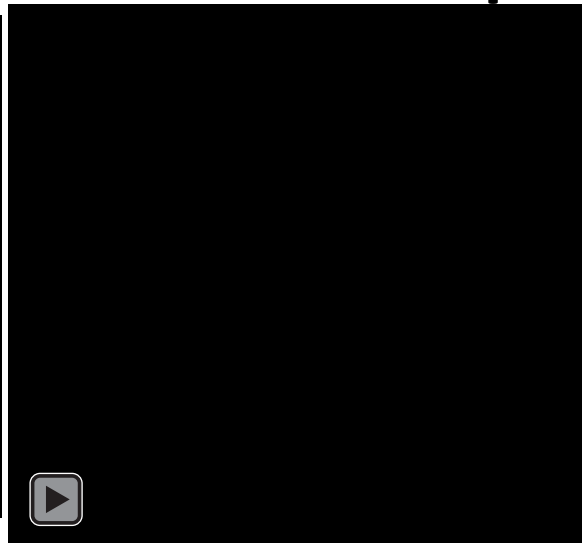
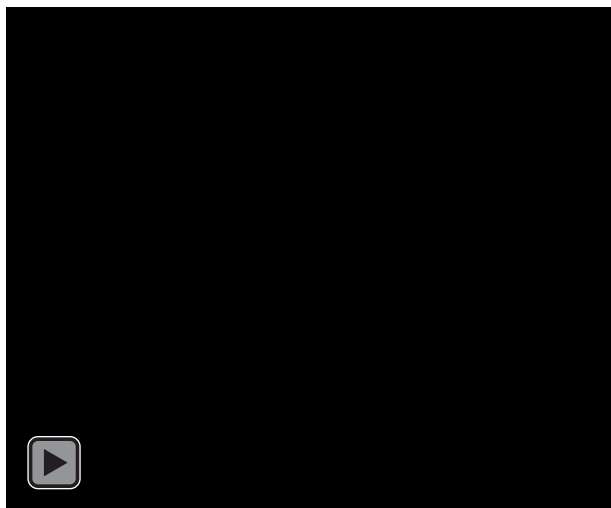


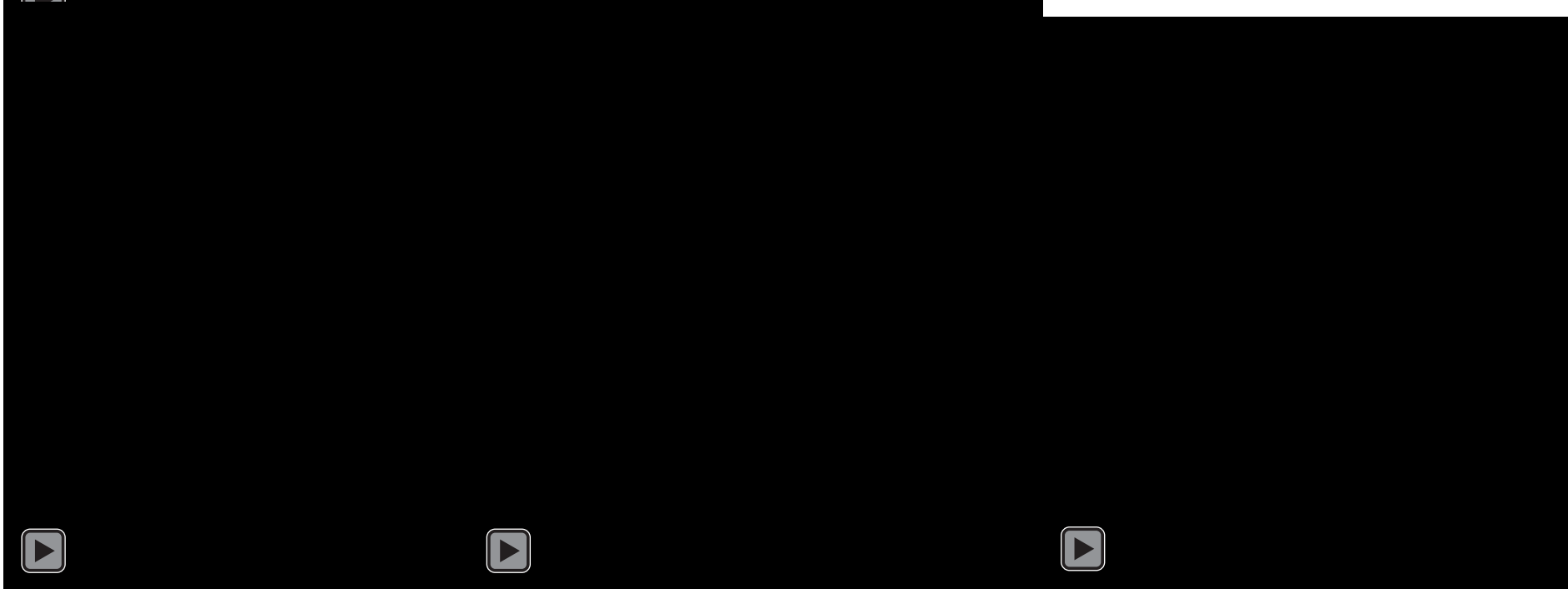
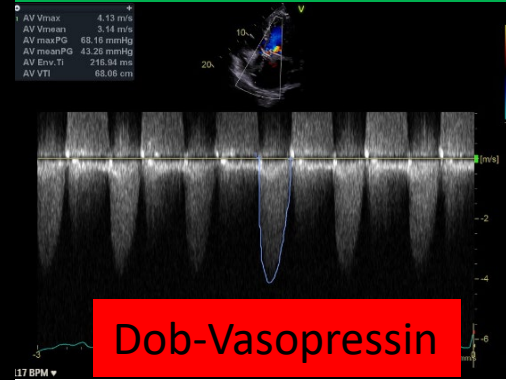
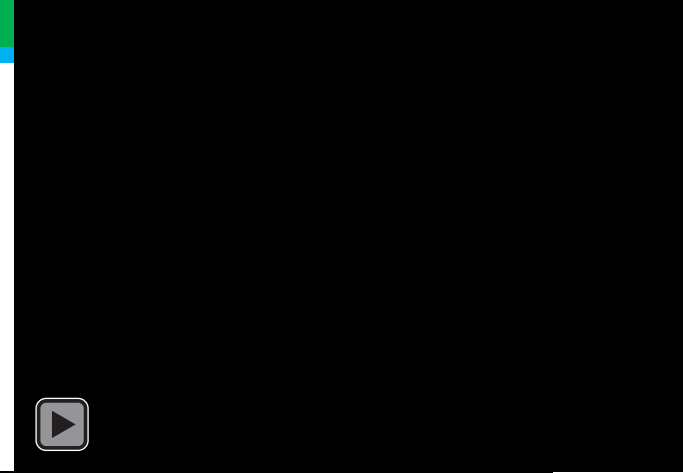
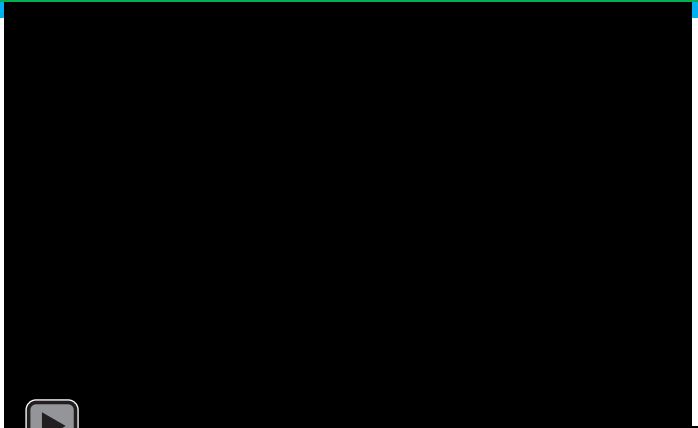
Number at risk:

Group1	3,286	1,605	1,493	1,406	994
Group2	610	319	303	285	165
Group3	387	148	135	132	101
Group4	696	332	306	292	214

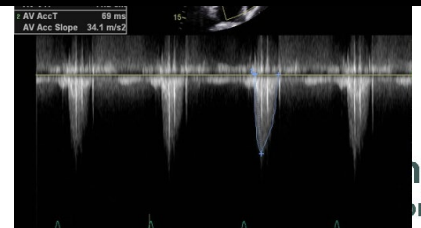
Figure 3 One-year all-cause mortality for pre-specified subgroups in the cardiogenic shock group. (A) \geq Moderate mitral regurgitation vs. \leq mild/

57 yo female ? Unicuspid Severe AS





65 yo Bicuspid AV



56 yo TX OSH Stage

D-CS

Lactic acid 3.7 CI 1.6

AKI

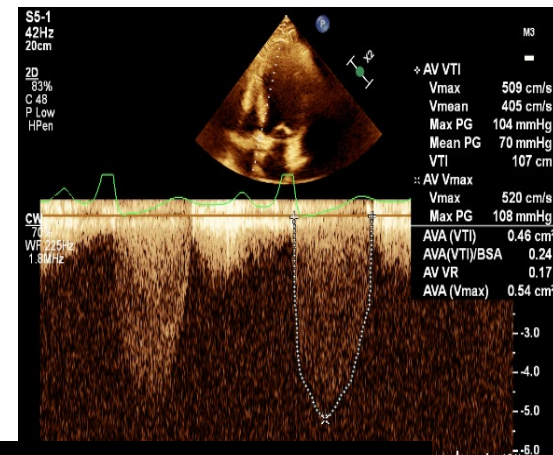
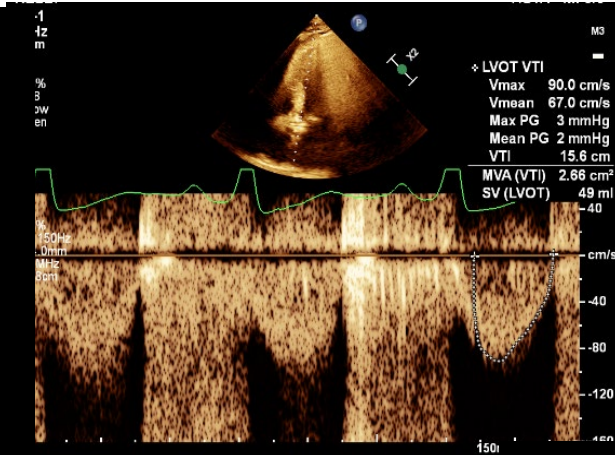


Table 4 Adjusted 30-day and 1-year outcomes for patients with and without cardiogenic shock

Outcomes ^a	Cardiogenic shock n = 4952	No cardiogenic shock n = 4952	Hazard ratio (95% CI)	P-value
Valve-related readmission	0.72% (31)	0.50% (23)	1.42 [0.83–2.43]	0.20
Any readmission	11.9% (507)	11.03% (499)	1.08 [0.95–1.22]	0.25
1-year outcomes				
All-cause mortality	29.70% (1126)	22.64% (800)	1.57 [1.43–1.72]	<0.0001
Cardiac death	11.34% (446)	5.78% (205)	2.35 [1.99–2.77]	<0.0001
Stroke	4.29% (178)	3.11% (124)	1.50 [1.20–1.89]	0.0004
All-cause mortality and stroke	31.85% (1238)	24.16% (871)	1.58 [1.45–1.72]	<0.0001
Aortic valve reintervention	0.83% (28)	0.54% (18)	1.71 [0.95–3.09]	0.07
Life-threatening bleeding	4.03% (157)	1.73% (69)	2.44 [1.84–3.24]	<0.0001
Major vascular complication	2.66% (124)	1.84% (82)	1.54 [1.17–2.04]	0.002
New dialysis	4.39% (193)	2.18% (87)	2.32 [1.80–2.99]	<0.0001
New onset atrial fibrillation	4.60% (172)	2.14% (82)	2.24 [1.72–2.92]	<0.0001
PCI	2.36% (98)	2.11% (72)	1.45 [1.07–1.96]	0.02
Permanent pacemaker	9.26% (411)	9.08% (418)	1.00 [0.87–1.15]	0.99
Valve-related readmission	2.89% (84)	2.32% (74)	1.28 [0.94–1.76]	0.12
Any re-admission	39.31% (1205)	37.78% (1290)	1.07 [0.99–1.16]	0.09

TAVR in CS Works, Safe
Quick and Effective
SAVR Works too!!!-But....