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TCT-66 Door to Impella Placement in Acute Coronary Syndrome Complicated by Cardiogenic Shock: An Updated Meta-analysis

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CARDIOGENIC SHOCK AND HEMODYNAMIC SUPPORT I

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TCT-65

Pulmonary Artery Catheter Use Is Associated With Lower Mortality in Cardiogenic Shock, Especially Among Patients With Heart Failure

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BACKGROUND The impact of pulmonary artery catheter (PAC) use on clinical outcomes among patient with cardiogenic shock (CS) due to heart failure (HF-CS) vs acute myocardial infarction (AMI-CS) remains unclear.

METHODS The Cardiogenic Shock Working Group registry includes data from CS patients hospitalized across 17 hospitals between 2016-2020. Outcomes were analyzed based on PAC use, SCAI shock severity stage, and underlying shock etiology.

RESULTS Of the 1,890 CS patients included in this analysis, 1,473 (77.9%) received a PAC during hospitalization, 593 (31.4%) had AMI-CS (PAC: 485 [81.8%], no PAC: 108 [18.2%]) and 1,055 (55.8%) had HF-CS (PAC: 834 [79.1%], no PAC: 221 [20.9%]). Use of PAC was associated with greater drug/device utilization, mechanical ventilation and hospital length of stay, regardless of CS etiology (all $P < 0.001$). Patients with a PAC had less in-hospital mortality in the overall (31% vs 41%, $P < 0.001$) and HF-CS cohort (21% vs 38%, $P < 0.001$), with significant differences in SCAI stages C ($P < 0.001$) and D ($P = 0.01$). PAC use was not associated with in-hospital mortality among AMI-CS patients (43% vs 41% $P = 0.6$), regardless of SCAI stage (all $P > 0.1$). PAC patients were more likely to undergo heart replacement therapy (HRT) compared to no PAC ($P < 0.05$) (**Table**).

	PAC			No PAC			p-value		
	Overall (n=1473)	AMI-CS (n=485)	HF-CS (n=834)	Overall (n=417)	AMI-CS (n=108)	HF-CS (n=221)	Overall	AMI-CS	HF-CS
Max SCAI							**<0.001**	**<0.001**	**<0.001**
B	18 (1.2)	7 (1.4)	10 (1.2)	8 (1.9)	2 (1.9)	4 (1.8)			
C	172 (11.7)	30 (6.2)	132 (15.8)	56 (13.4)	16 (14.8)	34 (15.4)			
D	777 (52.8)	220 (45.4)	489 (58.6)	174 (41.3)	42 (38.9)	107 (48.4)			
E	493 (33.5)	228 (47.0)	191 (22.9)	163 (39.1)	46 (42.6)	65 (29.4)			
Treatment Intensity									
Vasopressor/inotrope use							**<0.001**	**<0.001**	**<0.001**
0	57 (3.9)	24 (5.0)	32 (3.8)	33 (7.9)	13 (12.0)	16 (7.2)			
1	566 (38.4)	134 (27.6)	393 (47.1)	239 (57.3)	59 (54.6)	133 (60.2)			
2+	850 (57.7)	327 (67.4)	409 (49.0)	145 (34.8)	36 (33.3)	72 (32.6)			
Device use							**<0.001**	**<0.001**	**<0.001**
None	508 (34.5)	77 (15.9)	388 (46.5)	322 (77.2)	69 (63.9)	189 (85.5)			
IABP	267 (18.1)	99 (20.4)	145 (17.4)	19 (4.6)	11 (10.2)	7 (3.2)			
Impella	170 (11.5)	76 (15.7)	83 (10.0)	17 (4.1)	11 (10.2)	5 (2.3)			
ECMO	51 (3.5)	9 (1.9)	24 (2.9)	19 (4.6)	4 (3.7)	4 (1.8)			
Other	101 (6.9)	45 (9.3)	40 (4.8)	13 (3.1)	7 (6.5)	3 (1.4)			
Multiple	376 (25.5)	179 (36.9)	154 (18.5)	27 (6.5)	6 (5.6)	13 (5.9)			
RRT	372 (25.3)	137 (28.3)	178 (21.3)	71 (17.0)	17 (15.7)	31 (14.0)	**0.003**	0.05	**0.03**
Mechanical ventilation	1035 (70.3)	390 (80.4)	508 (60.9)	220 (52.8)	59 (54.6)	92 (41.6)	**<0.001**	**<0.001**	**<0.001**
Outcomes									
Died	454 (30.8)	210 (43.3)	178 (21.3)	170 (40.8)	44 (40.7)	83 (37.6)	**<0.001**	0.63	**<0.001**
Max SCAI Stage (%)									
B	11	14	10	25	0	25	0.37	0.57	0.38
C	5	13	2	13	19	6	**0.04**	0.63	**<0.001**
D	20	26	16	32	36	32	**0.001**	0.22	**0.01**
E	58	64	49	64	57	69	0.15	0.31	0.10
Survived									
HRT	250 (17.0)	23 (4.7)	214 (25.7)	10 (2.4)	0 (0.0)	9 (4.1)	**<0.001**	**0.02**	**<0.001**
NHS	769 (52.2)	252 (52.0)	442 (53.0)	237 (56.8)	64 (59.3)	129 (58.4)	0.09	0.17	0.15

Values are expressed in n (%)
Abbreviations: HF, heart failure; AMI, acute myocardial infarction; CS, cardiogenic shock; ECMO, extracorporeal membrane oxygenation; HRT, heart replacement therapy; IABP, intra-aortic balloon pump; IHCA, in-hospital cardiac arrest; Max, maximum; NHS, native heart survival; RRT, renal replacement therapy; SCAI, Society for Cardiovascular Angiography and Interventions.

CONCLUSION Using a large contemporary real-world dataset of CS, we identified that PAC use is associated with less in-hospital mortality and greater HRT, particularly among HF-CS patients. Furthermore, prospective efforts to define which CS populations derive the greatest benefit from PAC-guided interventions are urgently needed.

CATEGORIES CORONARY: Hemodynamic Support and Cardiogenic Shock

TCT-66

Door to Impella Placement in Acute Coronary Syndrome Complicated by Cardiogenic Shock: An Updated Meta-analysis

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BACKGROUND The impact of time to hemodynamic support in acute myocardial infarction complicated by cardiogenic shock (AMICS) has yet to be defined. The aim of this meta-analysis was to evaluate the impact of timing of mechanical circulatory support (MCS) with Impella.

METHODS a systematic literature review and meta-analysis was conducted using PubMed and Cochrane databases. All studies reporting short-term mortality rates and timing of Impella insertion, pre vs during/post PCI, were included. Primary end point was short-term mortality (≤30 days), while secondary end pointswere midterm mortality, device-related bleeding and limb ischemia.

RESULTS Of 1,289 studies identified, 13 studies (6,810 patients; 2,970 patients identified as receiving Impella before PCI and 3,840 patients receiving Impella during/after PCI) were included in this analysis. Median age was 63.8 years (IQR 63-65.7 years), 76% of patients were male, and a high prevalence of cardiovascular risk factors was noted across the entire population. Short-term mortality was significantly reduced in those receiving pre-PCI Impella support, 37.2% vs 53.6% (RR 0.7; CI 0.56-0.88). Midterm mortality was also lower in the pre-PCI group, 47.9% vs 73% (RR 0.81; CI 0.68-0.97). The rates of device-related bleeding (RR 1.05; CI 0.47-2.33) and limb ischemia (RR 1.6; CI 0.63-2.15) were similar between the two groups.

CONCLUSION This analysis suggests that MCS placement with Impella prior to PCI in AMICS may have a positive impact on short- and midterm mortality compared with post-PCI placement, with similar outcome in terms of safety.

CATEGORIES CORONARY: Hemodynamic Support and Cardiogenic Shock

TCT-67

Modification of the Impella Device for Instantaneous Determination of Native Left Ventricular Cardiac Output and Volume

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BACKGROUND The current Impella CP (Abiomed; Danvers, MA) pump used for mechanical circulatory support (MCS) in patients with cardiogenic shock (CS) does not have the ability to assess native cardiac output (CO) and left ventricular (LV) volumes. These data are valuable in facilitating device management and weaning. Admittance technology allows for accurate assessment of cardiac chamber volumes, and could be integrated onto existing Impella pumps to address this need.

METHODS Impella CP pumps were successfully fitted with four admittance electrodes and placed in the LV of adult swine (n = 9) subjected to three different hemodynamic conditions including Impella CP speed adjustments, administration of escalating doses of dobutamine, and microsphere injections into the left main artery to result in cardiac injury. CO by admittance electrodes was calculated from LV volumes and heart rate. In addition, CO was calculated in each instance via thermodilution, continuous CO (CCO) measurement, Fick's principle and aortic velocity-time integral (VTI) by echocardiography.

RESULTS Modified Impella CP pumps were placed in swine LV successfully. CO as determined by admittance electrodes was congruent with other methods of CO assessment (intraclass correlation coefficient >0.85), and calculated LV chamber volumes trended as expected ($P < 0.001$) in each experimental protocol. Bland-Altman analysis demonstrated minimal bias when comparing CO from admittance