HEMODYNAMIC SUPPORT AND CARDIOGENIC SHOCK

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30-day survival in patients with cardiogenic shock: Impella 2.5 versus Impella 4.0

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BACKGROUND The Impella (Abiomed, Inc.) is a percutaneous left ventricular assist device. It can be used in patients presenting with acute myocardial infarction (AMI) complicated by cardiogenic shock (CS) or in the elective setting for patients undergoing high-risk percutaneous coronary intervention (PCI). Recently, the more powerful Impella 4.0 (generating output up to 4L/min) was introduced. In this retrospective study, we investigated 30-day outcome in patients supported by Impella 2.5 or 4.0 in the acute setting of cardiogenic shock.

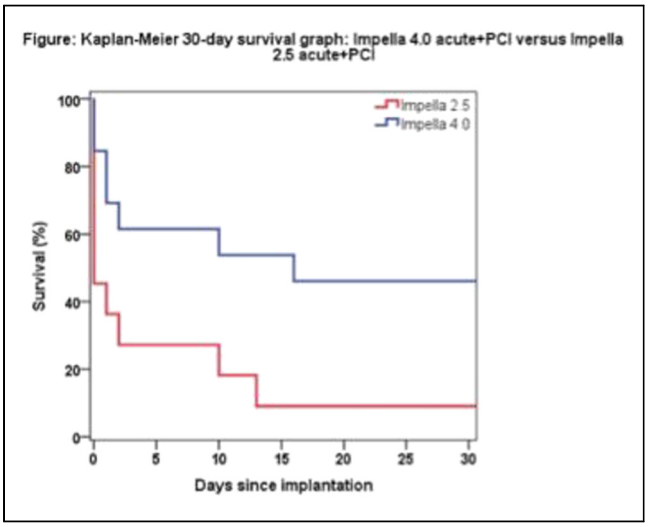
METHODS From January 2009 till January 2015, 50 patients were supported with the Impella-device in the Catharina Hospital Eindhoven, the Netherlands (a high-volume PCI centre). The Impella 2.5 was implanted from 2009 till 2013 and from 2013 the Impella 4.0 was implanted exclusively. Study end point was 30-day survival.

RESULTS Patient characteristics were similar between the patient groups treated by Impella 4.0 and Impella 2.5, respectively (table). Of all 50 patients, 24 presented with AMI complicated by CS, 6 presented with CS from other cause and 20 underwent high-risk elective PCI. In the AMI plus CS-group, 13 patients were treated with Impella 4.0 and 11 patients were treated with Impella 2.5. All these patients were treated by PCI and after 30 days, survival in the AMI plus CS Impella 4.0-group was significantly higher compared to the AMI plus CS Impella 2.5-group (46% versus 9%, P=0.02) (figure). In patients undergoing high-risk elective PCI, there was no difference in 30-day survival between Impella 4.0 and Impella 2.5 (63% versus 61%, P=0.87).

Table. Baseline characteristics

	Impella 4.0 acute + PCI (13)	Impella 2.5 acute + PCI (11)
Age (yrs)	57±12	66±9
Male	9 (69%)	7 (64%)
Diabetes	3 (23%)	3 (27%)
Hypertension	6 (46%)	5 (45%)
Hypercholesterolemia	2 (15%)	3 (27%)
BMI (kg/cm^2)	25±4	27±3
Previous MI	2 (15%)	2 (18%)
Previous PCI	0 (0%)	1 (9%)
Previous CABG	0 (0%)	0 (0%)
Resuscitation	6 (46%)	7 (64%)
Cardiogenic shock	13 (100%)	11 (100%)
PCI	13 (100%)	11 (100%)
LVEF < 30%	10 (77%)	9 (82%)

MI = Myocardial infarction; PCI = Percutaneous coronary intervention; CABG = Coronary artery bypass graft; LVEF = Left ventricular ejection fraction



CONCLUSIONS In this retrospective analysis, Impella 4.0 improved survival significantly in patients with AMI complicated by CS undergoing PCI compared to Impella 2.5. These novel findings support the concept of the Impella-device. Randomized trials with the Impella 4.0 are warranted.

CATEGORIES CORONARY: Hemodynamic Support and Cardiogenic Shock

KEYWORDS Acute myocardial infarction, Cardiogenic shock, Impella

TCT-188

Outcome After Implantation of an Impella® Microaxial-flow Pump in Patients with Cardiogenic Shock

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BACKGROUND The Impella Circulatory Support System has been developed to unload the left ventricle in patients with severely reduced systolic function and to maintain basic circulation patients with cardiogenic shock due to left-ventricular failure. We enrolled all patients undergoing implantation of an Impella-pump in our department into a registry to further analyze patient characteristics and predictors of outcome.

METHODS Since July 2011 all patients, who received an Impella microaxial pump were enrolled in our registry. Data on baseline characteristics and in-hospital treatment including cardiovascular risk factors, details on coronary angiography, hemodynamic parameters, and laboratory parameters were documented in detail. Furthermore, data on the outcome of those patients including follow-up until 12 months after implantation were recorded. In total, until June 2015, 175 patients underwent implantation of an Impella pump at our center. Complete data including follow-up until 12 months are available in 100 patients.

RESULTS Cardiogenic shock was the indication for implantation in 85% of the cases, in the other patients the purpose for the implantation were high-risk percutaneous coronary interventions. In shock patients mean age was 62 years (19-83 years). 74% of the patients were male. Coronary heart disease was excluded by coronary angiography in 21%. Median device time was 5 days (interquartile range (IQR) 1-7 days). In-hospital mortality was 8.3% in patients with isolated left-ventricular dysfunction. Relevant contributors to worsened prognosis were concomitant right-ventricular failure, necessity of additive ECMO, new-onset dialysis, and pre-procedural cardiopulmonary resuscitation. Higher body mass index (28.3 vs 25.9; p<0.01), right heart failure (42% vs. 11%, p<0.05) and persistently elevated central venous pressure after 6 hours (15 mmHg vs. 11 mmHg, p<0.05) were more common in non-survivors. Neurological outcome was CPC class 1&2 in 91% of survivors. Average lactate levels were 6.7 mmol/L (survivors) and 7.6 mmol/L (non-survivors; p=0.652) during admission, 3.2 mmol/L (survivors) and 5.9 mmol/L (non-survivors; p=0.028) 1h after Impella implantation, and 2.2 mmol/L (survivors) and 5.9 mmol/L (non-survivors; p=0.008) 4h after Impella implantation.