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# Prospective registry of cardiogenic shock patients in cath-lab patients of a tertiary centre

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## Aim of the study

The aim of the present study is to analyze an all-comer cohort of patients in cardiogenic shock right after initiating a VA-ECMO program in April 2019 at out tertiary centre.

## Background and intervention

Cardiogenic shock (CS) is a high-acuity and challenging situation. Despite the best possible medical care, outcome of patients in CS is still poor. Previous data suggest that the use of a mechanical circulatory support (MCS) system might provide outcome benefit in selected patient population.

The use of MCS systems requires standardized criteria for clinical SOPs. Contraindications for the use of MCS systems at our centre can be seen in table 1.

There was no study intervention.

### Table 1

| contra-indications | CPR | no CPR |
|---|---|---|
| biological age (years) | > 60 | > 70 |
| pH | < 6,8 | < 7,1 |
| initial lactate (mmol/L) | > 20 | > 15 |
| co-morbidities | COPD > III; neurological, internal or oncological diseases with palliative treatment | |
| furthermore | no bystander-CPR / no-flow-time > 10 min; CPR > 45 min without ROSC; contraindication for full anticoagulation (bleeding, trauma, hematothorax,…) | - |

## Methods

Between April 2019 and March 2021 patients with acute coronary syndrome and vasopressor requiring hemodynamic instability were enrolled in the present prospective single-centre registry.

Patient data about clinical characteristics, comorbidities, vital and labor parameters, coronary intervention and intensive medical care were collected and the outcome was analyzed with regard to hospitalization, in-hospital mortality and 28-day mortality.

## Results

In hospital mortality was 50.4%, highest among patients with ECMO. However, these patients were admitted with markedly worse circulatory conditions: visibly higher rate of CPR, higher baseline lactate level and lower initial pH (see table 2), whereas patients treated with IMPELLA were characterized by better baseline values compared to the overall cohort.
Four patients were treated with ECMELLA, three of them were discharged alive. 1-, 7- and 28-days mortality was comparable between patients with versus without device support. Considering only patients, who survived the in-hospital phase these were characterized by a median ventilation duration (2 days) and a median CCU stay (6 days). The initial lactate of survival patients was lower (2.1 mmol/L vs 5.3 mmol/L), the initial pH was higher (7.33 vs 7.22) in this group compared to the group who died.

### Table 2

| | overall (n=248) | no device (n=200) | ECMO (n=20) | IMPELLA (n=24) | ECMELLA (n=4) |
|---|---|---|---|---|---|
| Age (years), median (IQR) | 70 (58-77) | 71 (59-79) | 65 (57-71) | 69 (61-74) | 55 (50-65) |
| male gender, n (%) | 178 (71.8) | 143 (71.5) | 16 (80.0) | 16 (66.7) | 3 (75.0) |
| BMI, median (IQR) | 26.8 (24.5-30.2) | 26.7 (24.5-30.3) | 28.1 (24.7-29.8) | 27.4 (24.5-30.6) | 24.5 (23.4-25.9) |
| non CPR, n (%) | 87 (35.1) | 63 (31.5) | 5 (25.0) | 16 (66.7) | 3 (75.0) |
| ------discharged alive, n (%) | 56 (64.4) | 42 (66.7) | 1 (20.0) | 11 (68.8) | 2 (66.7) |
| CPR, n (%) | 161 (64.9) | 137 (68.5) | 15 (75.0) | 8 (33.3) | 1 (25.0) |
| ------discharged alive, n (%) | 67 (41.6) | 61 (44.5) | 3 (20.0) | 2 (25.0) | 1 (100) |
| ---OHCA, n (overall %) | 104 (41.9) | 92 (46.0) | 7 (35.0) | 5 (20.8) | 0 |
| ------discharged alive, n (%) | 48 (46.2) | 45 (48.9) | 2 (28.6) | 1 (20.0) | 0 |
| ---IHCA, n (overall %) | 57 (23.0) | 45 (22.5) | 8 (40.0) | 3 (12.5) | 1 (25.0) |
| ------discharged alive, n (%) | 19 (33.3) | 16 (35.6) | 1 (12.5) | 1 (33.3) | 1 (100) |
| underlying disease, n (%): | | | | | |
| ---STEMI | 131 (52.8) | 104 (52.0) | 12 (60.0) | 12 (50.0) | 3 (75.0) |
| ---NSTEMI | 44 (17.7) | 36 (18.0) | 4 (20.0) | 4 (16.7) | 0 |
| ---others (arrhythmia, valvular, …) | 73 (29.4) | 60 (30.0) | 4 (20.0) | 8 (33.3) | 1 (25.0) |
| initial lactate (mmol/L), median (IQR) | 3.4 (1.7-6.2) | 3.3 (1.7-6.0) | 6.3 (3.2-11.1) | 2.7 (1.4-6.1) | 2.3 (1.7-7.2) |
| initial pH, median (IQR) | 7.28 (7.16-7.37) | 7.28 (7.17-7.37) | 7.24 (7.07-7.30) | 7.35 (7.19-7.41) | 7.31 (7.27-7.37) |
| ventilation duration (days), median (IQR) | 2 (0-7) | 1 (0-6) | 8 (4-16) | 1 (0-5) | 16 (10-22) |
| total CCU stay after surviving day of shock (days), median (IQR) | 5 (3-12) | 5 (3-12) | 14 (7-21) | 5 (3-10) | 36 (13-58) |
| first-day-mortality, n (%) | 60 (24.2) | 50 (25.0) | 5 (40.0) | 5 (20.8) | 0 |
| 7-day-mortality, n (%) | 98 (39.5) | 78 (39.0) | 9 (45.0) | 10 (41.7) | 1 (25.0) |
| 28-day-mortality, n (%) | 123 (49.6) | 96 (48.0) | 15 (75.0) | 11 (45.8) | 1 (25.0) |
| in-hospital-death, n (%) | 125 (50.4) | 97 (48.5) | 16 (80.0) | 11 (45.8) | 1 (25.0) |

## Conclusion and outlook

Cardiogenic shock is characterized by a poor prognosis. The use of MCS systems can help to reach an improved outcome in very severe patients, but patients characteristics strongly determine that outcome. Therefore, patient selection is crucial to achieve adequate results in this vulnerable group.
All patients who survived CS and were able to be discharged, will be further analyzed in a follow-up study to show long-term prognosis.