Elucidating Clinical Phenotypes of Patients with Mixed Shock Admitted to Cardiac Intensive Care Units: Insights from the Critical Care Cardiology Trials Network

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BACKGROUND

- Mixed shock accounts for 20% of shock cases seen in contemporary cardiac intensive care units (CICUs).
- Emerging data suggests that mixed shock has high mortality; however, this population is still poorly understood and not well characterized.

METHODS

- The CCCTN is a multicenter network of advanced cardiac intensive care units (CICUs) in North America.
- During 2017-2020, each CICU contributed an annual 2-month period of all consecutive admissions (n=13,300).
- Mixed shock (MS) subjects were stratified into those with acute MI (AMI-MS) and without (non-AMI-MS).

RESULTS

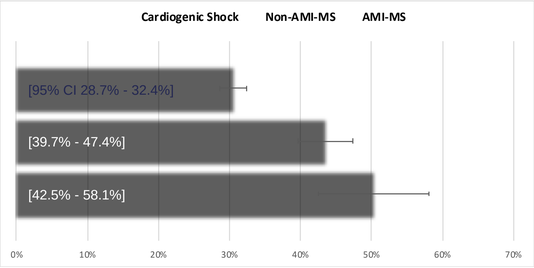
- Among 3884 CICU admissions with shock, 840 (22%) presented with MS; 169 AMI-MS and 671 non-AMI-MS.
- Of MS patients, 87 had clear evolution from CS to MS while 687 were captured as primary MS.
- Overall, pts with MS had high shock severity; Median SOFA score was 10.0 (25-75th %ile, 7.0-12.5) in MS and 7.0 (5.0-10.0) in primary CS patients
- Comparing AMI vs. non-AMI MS, hx of HF (**Table**) and acute sepsis (47.8% vs 67.6%, p<0.001) were less common in AMI-MS. AMI-MS had more end-organ injury: lactate & AST (**Table**, p<0.01).

FIGURES AND TABLES

Table. Baseline Characteristics

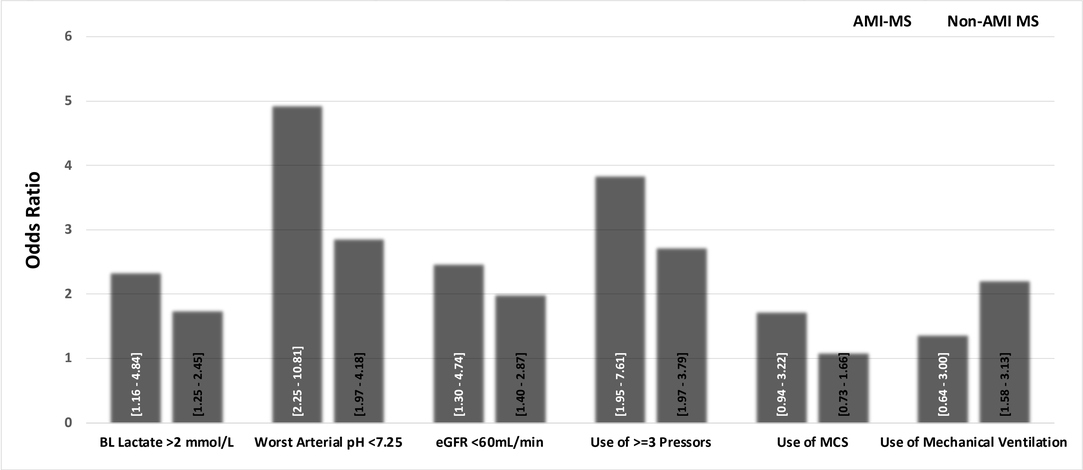
Characteristic	Overall (n=840)	AMI-MS (N=169)	non-AMI-MS (N=671)	p-value
Demographics				
Age (yrs)	66.0	68.0	65.0	0.014
Weight (kg)	80.3	82.0	79.8	0.91
Female (%)	35.5%	37.9%	34.9%	0.47
White (%)	68.2%	68.6%	68.1%	0.16
History				
Chronic Kidney Disease	33.6%	26.0%	35.5%	0.020
Diabetes Mellitus	37.1%	46.7%	34.7%	0.004
Coronary Artery Diseas	38.0%	42.0%	37.0%	0.23
Atrial Fibrillation	31.4%	11.8%	36.4%	<0.001
Ventricular Arrhythmia	7.9%	2.4%	9.2%	0.003
Severe Valvular Disease	21.3%	10.1%	24.1%	<0.001
Pulmonary Hypertensio	8.9%	4.1%	10.1%	0.015
Heart Failure	55.5%	24.3%	63.3%	<0.001
At Baseline				
Lactate	2.8	3.5	2.7	0.007
AST	62.0	126.0	54.0	0.006

Figure 1. In-Hospital Mortality by Shock Etiology



*Error bars indicate 95% Confidence Intervals

Figure 2. Risk Indicators for In-Hospital Mortality in AMI MS vs non-AMI MS (univariable)



*Referent is low risk group for each risk indicator above

RESULTS (Continued)

- Length of hospital stay was 16.0 (IQR, 9.5-26.1) and 16.8 (IQR, 9.6-27.0) days for AMI and non-AMI MS.
- Use of advanced ICU therapies in MS was high and AMI-CS required more use (p<0.0001 for each) of:
  - Mechanical ventilation (81.1% vs 67.5%)
  - Invasive cardiac procedures (76.3% vs 16.2%)
  - Temporary mechanical support (56.8% vs 16.7%).
- AMI-MS, non-AMI-MS, and "pure" cardiogenic shock had in-hospital mortality of 50.3% vs. 43.5% vs. 30.5%, respectively (p<0.0001, **Figure 1**).
- Among AMI-MS patients, risk indicators for in-hospital mortality were worst pH <7.25, treatment with ≥3 pressors, and use of renal replacement therapy.

CONCLUSIONS

- In a contemporary multicenter analysis of advanced CICUs, patients with mixed shock had high in-hospital mortality and need for advanced ICU care.
- Patients with AMI-MS present with particularly high shock severity and subsequent resource utilization.
- Low arterial pH, use of ≥ 3 pressors, and need for RRT are poor prognostic indicators in MS.

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DISCLOSURE OF FACULTY RELATIONSHIPS:
The authors have no disclosures related to the content of this abstract.