

Cardiogenic shock

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Take Home Message

- Cardiogenic shock is defined as hypotension (SBP \leq 90 mmHg) despite adequate filling status with signs of hypoperfusion .
- The pathogenetic scenarios of cardiogenic shock range from low-output advanced end-stage chronic HF to acute-onset de novo HF (cold and wet)
- cardiogenic shock occurs in 5-8% of STEMI, and in 2.5% of non-STEMI with added high mortality >80%

- In post-MI and ACS cardiogenic shock ,early revascularization with PCI remains the cornerstone of therapy, offering >10% increases in survival (within 2 hours from hospital admission)
- The survival benefit may be seen as long as 48 hours after MI and 18 hours after shock onset
- There is no agreement on the optimal method of haemodynamic monitoring in assessing and treating patients in cardiogenic shock,including PA catheterization.

- Pharmacologic therapy aims to improve organ perfusion by increasing cardiac output and blood pressure. After fluid challenge, pharmacologic management consists of an inotropic agent and a vasopressor as needed. Treatment is guided by the continuous monitoring of organ perfusion and haemodynamics.
- As a vasopressor, norepinephrine is recommended when mean arterial pressure needs pharmacologic support. Dobutamine is the most commonly used adrenergic inotrope.

- Levosimendan may also be used in combination with a Vasopressor
- Levosimendan infusion in cardiogenic shock following AMI on top of dobutamine and norepinephrine improved cardiovascular haemodynamics without leading to hypotension. PDE3 inhibitors may be another option, especially in non-ischaemic patients.

- Device therapy has to be considered when there is an inadequate response
- Recently the IABP-SHOCK II trial showed that the use of an IABP did not improve outcomes in patients suffering from AMI and cardiogenic shock
- Therefore, routine use of an IABP cannot be recommended.

- Percutaneous post MI VSD closure is an evolving therapeutic modality
- Intensive insulin therapy improves survival in hyperglycemic critically ill patients and is recommended in cardiogenic shock complicating MI
- Veno-arterial ECMO and MCS like Impella pump and the Tandem-Heart may also be used, but they have not been shown to improve outcome

Recommendations regarding management of patients with cardiogenic shock

Recommendations	Class ^a	Level ^b	Ref ^c
In all patients with suspected cardiogenic shock, immediate ECG and echocardiography are recommended.	I	C	
All patients with cardiogenic shock should be rapidly transferred to a tertiary care center which has a 24/7 service of cardiac catheterization, and a dedicated ICU/CCU with availability of short-term mechanical circulatory support.	I	C	
In patients with cardiogenic shock complicating ACS an immediate coronary angiography is recommended (within 2 hours from hospital admission) with an intent to perform coronary revascularization.	I	C	
Continuous ECG and blood pressure monitoring are recommended.	I	C	
Invasive monitoring with an arterial line is recommended.	I	C	
Fluid challenge (saline or Ringer's lactate, >200 ml/15–30 min) is recommended as the first-line treatment if there is no sign of overt fluid overload.	I	C	
Intravenous inotropic agents (dobutamine) may be considered to increase cardiac output.	IIb	C	
Vasopressors (norepinephrine preferable over dopamine) may be considered if there is a need to maintain SBP in the presence of persistent hypoperfusion.	IIb	B	558
IABP is not routinely recommended in cardiogenic shock.	III	B	585, 586
Short-term mechanical circulatory support may be considered in refractory cardiogenic shock depending on patient age, comorbidities and neurological function.	IIb	C	

- Early application of appropriate interventions for cardiogenic shock-including medical therapies, revascularization, temporary hemodynamic support devices, and durable mechanical circulatory support-may improve outcomes.
- The number and complexity of therapies for cardiogenic shock are increasing, making time-dependent decision-making more challenging.
- A multidisciplinary cardiogenic shock team is recommended to guide the rapid and efficient use of these available treatments.

