

What's new in shock team approach?

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- Cardiogenic shock (CS) is a syndrome of hypotension and tissue hypo-perfusion resulting from cardiac dysfunction
- Early mortality remains high despite advances in therapy
- Due to advanced options of management, its not single individual job any more

Why is that ?

Contemporary definition of cardiogenic shock

1. Cardiac cause and signs of congestion
2. SBP <90 mmHg for >30 min or vasopressors or inotropes required to maintain SBP >90 mmHg plus
3. Impaired organ perfusion with 1 or more of the following criteria:
 - (i) altered mental status
 - (ii) cold, clammy skin and extremities
 - (iii) serum lactate >2.0 mmol/l
 - (iv) oliguria with urine output <30 ml/h (<0.5ml/kg/min)

PAC criteria less often used (1/3 of patients have PAC)

- CI < 1.8-2.2 l/min/m²; PCWp > 18-20 mmHg

Non-ischemic cardiac and non-cardiac causes of shock

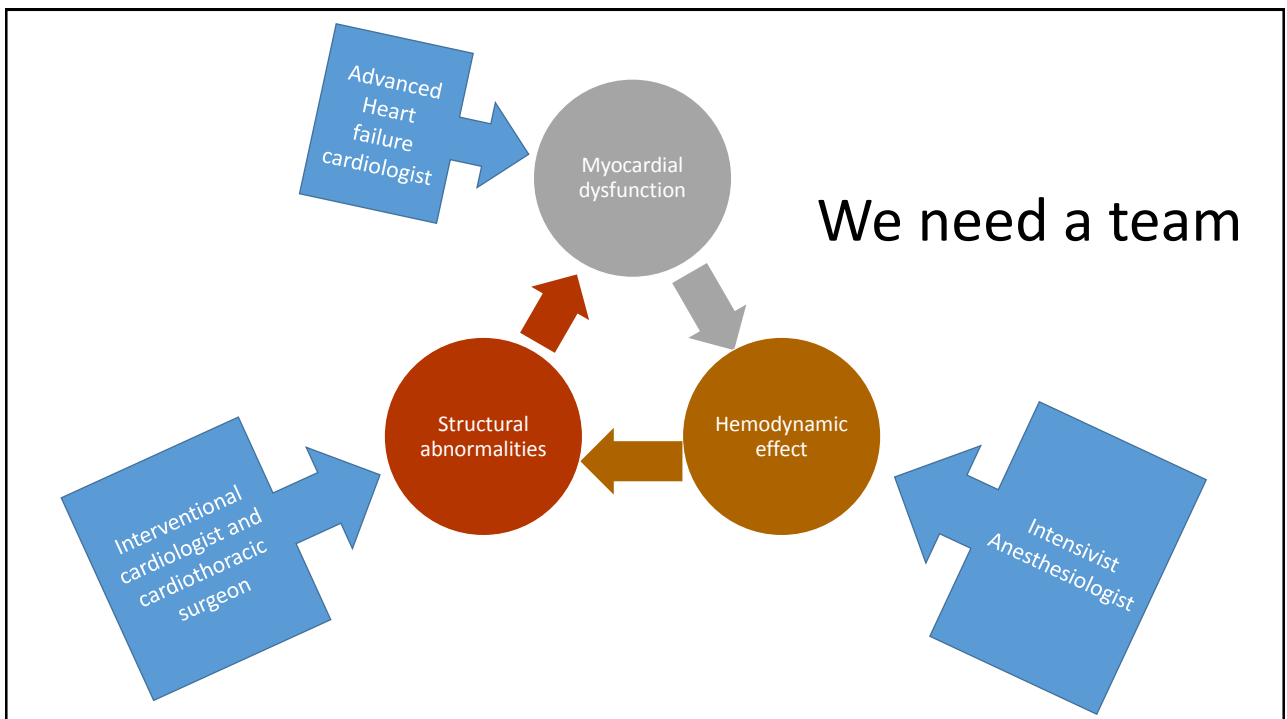
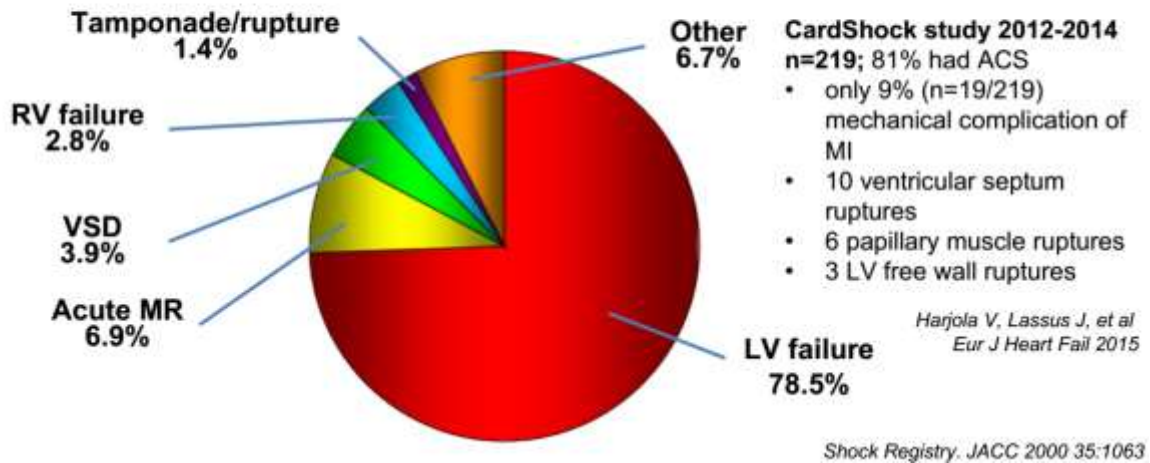
Non-ischemic causes of CS

- high-risk pulmonary embolism
- cardiac tamponade
- acute myocarditis
- prolonged dysrhythmia
- valvular cause
- Tako-Tsubo
- end-stage CHF
- intoxications

Differential diagnosis

- sepsis
- hypovolaemia
- vasovagal reactions
- pharmacological side effects (vasodilator in AS, propofol etc)

Etiological factors after AMI: data from SHOCK trial (n=232) and registry (n= 1190)





Why do we need the team approach?

- Cardiogenic shock is a perfect example of a time-dependent clinical scenario
- Application of the Heart Team model helps in collaborative decision-making in a very sick population

Goals of the team are to:

- Ensure **rapid identification** of CS and determine the underlying etiology
- **Maximize survival** through the utilization of revascularization and supportive therapies
- Develop and implement a plan for **escalation of hemodynamic support** with mechanical devices in the case of refractory cardiogenic shock.

Role of the team in every step of the management of cardiogenic shock (CS)

Medical Management

- initial management of shock relies on intravenous inotropes/vasodilators or vasopressors
- Therapy should be titrated to maintain end-organ function
- Minima effective doses are preferred
- Inotrope-induced tachycardia and increased left ventricular afterload can worsen myocardial oxygen demand and increase ischemia

- Team based discussion of therapeutic options may be warranted if clinical improvement is not seen immediately with vasoactive medications
- Early use of mechanical circulatory support could avoid the negative hemodynamic and arrhythmogenic effects of high-dose inotrope or vasopressor therapy
- Team can also decide the need of **Targeted Temperature Management** for selected patients with refractory shock

Revascularization

- Guidelines recommend early revascularization for all patients with STEMI and patients with cardiogenic shock in the setting of (NSTEMI)/ ACS
- The SHOCK trial demonstrated mortality benefit in CS patient with early revascularization in 6 months (50.3% vs 61.3%) [2] and at 6 years (32.8% vs 19.6%)
- Emergency catheterization activation protocol can be integrated into the team-based management protocol for CS

Mechanical circulatory support devices

- For patients with shock refractory to conventional medical therapy
- For patients with CS unlikely to stabilize on medical therapy alone
- Can improve cardiac index, systemic blood pressure, and tissue perfusion
- Simultaneously they reduce left ventricle pressure, volume, and workload

Mechanical circulatory support in CS

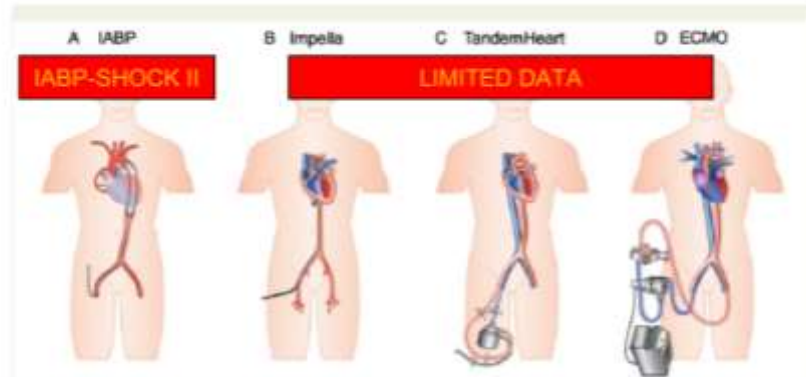


Table 1. Proposed haemodynamic effects of the mechanical circulatory support devices

	IABP	ECHO	TandemHeart	Impella
Afterload	Reduced	Increased	Increased	Neutral
LV stroke volume	Slight increase	Reduced	Reduced	Reduced
Coronary perfusion	Slight increase	Unknown	Unknown	Unknown
LV pre-load	Slightly reduced	Reduced	Reduced	Slightly reduced
PCW pressure	Slightly reduced	Reduced	Reduced	Slightly reduced
Peripheral tissue perfusion	No significant increase	Improved	Improved	Improved

- The devices increases hemodynamic support at the cost of more invasive vascular access and increased complication rate
- Multidisciplinary decision-making is essential to ensure optimal device choice and plan for escalation of support if necessary
- Early engagement of advanced heart failure specialists and cardiothoracic surgeons can clarify patient eligibility for durable mechanical circulatory support or cardiac transplantation.

2014 ESC/EACTS Guidelines on myocardial revascularization

The Task Force on Myocardial Revascularization of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)

Recommendations for management of patients with acute heart failure in the setting of ACS

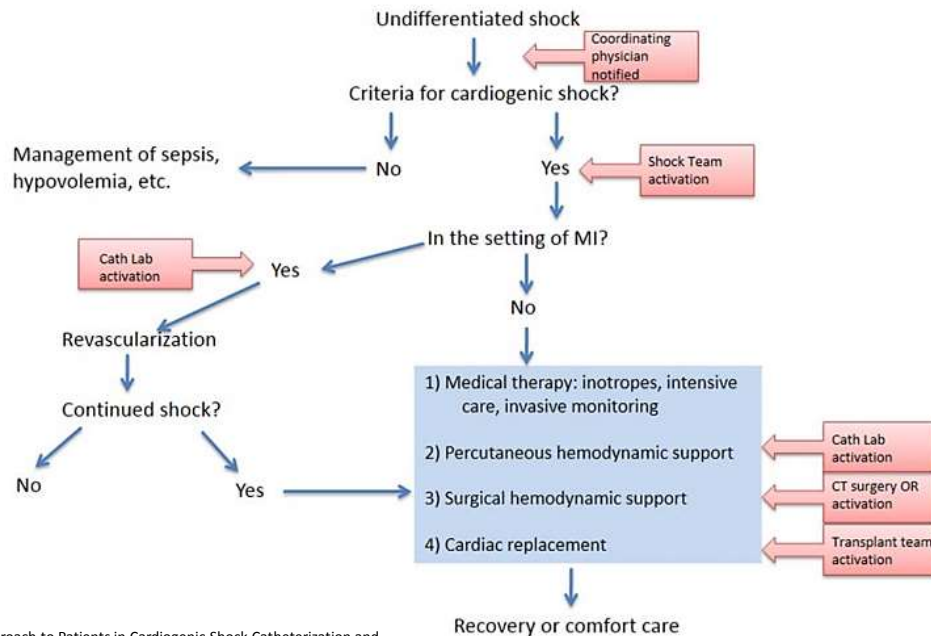
Recommendations	Class ^a	Level ^b	Ref ^c
Emergency echocardiography is indicated to assess LV and valvular function and exclude mechanical complications.	I	C	
Emergency invasive evaluation is indicated in patients with acute heart failure or cardiogenic shock complicating ACS.	I	B	180,201, 221,331
Emergency PCI is indicated for patients with cardiogenic shock due to STEMI or NSTEMI-ACS if coronary anatomy is amenable.	I	B	221
Emergency CABG is recommended for patients with cardiogenic shock if the coronary anatomy is not amenable to PCI.	I	B	221
Emergency surgery for mechanical complications of acute myocardial infarction is indicated in case of haemodynamic instability.	I	C	
IABP insertion should be considered in patients with haemodynamic instability/cardiogenic shock due to mechanical complications.	IIa	C	

Patients with mechanical complication after acute myocardial infarction require immediate discussion by the Heart Team.	I	C	
Short-term mechanical circulatory support in ACS patients with cardiogenic shock may be considered.	IIb	C	
Percutaneous repair of VSD may be considered after discussion by the Heart Team.	IIb	C	
Routine use of IABP in patients with cardiogenic shock is not recommended.	III	A	332,333

Elements of shock team

Element	On-call physician representative	Responsibilities	Necessary components
1) Intensive care unit	Coordinating physician (intensivist or cardiologist)	-Diagnosis -Triage -Activation of additional team members -Medical management -Invasive hemodynamic monitoring -Maintenance of hemodynamic support devices	-24-hour on-site physician -24-hour nursing support for vasopressor and inotrope infusions, PA catheters and hemodynamic support devices
2) Cardiac catheterization laboratory	Interventional cardiologist	-Revascularization for AMI -Percutaneous hemodynamic support device placement	-On call nurse and technician team -24-hour cath lab availability
3) Cardiothoracic surgery	Cardiothoracic surgeon	-ECMO placement -Temporary VAD placement -Heart transplantation	-On-call OR staff -On-call perfusionist team -24-hour operating room availability
4) Advanced heart failure	Advanced heart failure cardiologist	-Coordinate medical evaluation and listing for heart transplantation and durable VAD -Identify treatment options for patients with decompensated CHF	-Participation in United Network for Organ Sharing (UNOS) -Mature VAD program

A Team-Based Approach to Patients in Cardiogenic Shock Catheterization and Cardiovascular Interventions 88:424–433 (2016)



A Team-Based Approach to Patients in Cardiogenic Shock Catheterization and Cardiovascular Interventions 88:424–433 (2016)

- Availability of emergency PCI, hemodynamic support devices, and cardiac transplantation is limited to specialized referral centers
- Regional referral network for cardiogenic shock care is necessary
- tertiary center can provide a mobile team of specialists
- They can evaluate and transfer cardiogenic shock patients, with on-site placement of advanced hemodynamic support as needed



A traveling team concept to expedite the transfer and management of unstable patients in cardiopulmonary shock

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KEY WORDS:
ECMO;
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transfer;
assist devices;
cardiogenic shock;
ARDS

Emergent mechanical support with transfer of patients in acute cardiopulmonary shock to specialty centers for definitive management is often required at non-transplant centers. An alternative approach to the traditional "hub and spoke" model is presented. A team of health care specialists from our hospital is deployed to the community hospital for stabilization, possible implantation, and transfer of patients to our tertiary care facility. Patient assessment can be made with intervention, allowing stabilization and safe transfer by our team to our institution. This method provides tertiary level care at the referring hospital and may improve survival for a sub-set of patients in the community hospital setting.

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Deactivation of the team

- Cardiogenic shock resolves
- definitive hemodynamic support is achieved
- decision is made to transition to comfort care
- SHOCK team activation, in some instances, may lead to de-escalation of care when further treatment is futile or contrary to patient goals

Limitations of shock team program

- Current hospital systems are heterogeneous, and implementation of a SHOCK team will necessarily be individualized and dependent on local factors
- The cost-effectiveness of SHOCK team strategy is unclear as care of CS patients is already expensive
- The CS population is relatively small and difficult to study in large randomized trial to evaluate effectiveness of a SHOCK team



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Cardiogenic Shock Team

The Massachusetts General Hospital Cardiogenic Shock Team provides urgent evaluation and care to patients experiencing cardiogenic shock, a condition in which the heart is unable to pump enough blood to support the needs of the body's organs.

Learn more about the
Mechanical Circulatory
Support Program

Call for an urgent evaluation request:
☎ 617-726-2966

Leading Expertise in Treating Cardiogenic Shock

Cardiogenic shock is a condition in which the heart is unable to pump enough blood to meet the needs of the body. It most commonly occurs soon after a massive heart attack, but it can also occur after heart surgery or with an acute illness such as cardiomyopathy, which is a weakening of the heart muscle. Occasionally, patients with chronic heart failure will deteriorate to cardiogenic shock.

Patients with cardiogenic shock must be treated promptly in order to restore perfusion, the process of delivering blood to the body's


Reach the Cardiogenic Shock Team

Physicians should call 617-726-2966 to speak with the Cardiogenic Shock team member on call.

The Mass General Cardiogenic Shock Team is available 24 hours a day.

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Role of a Multidisciplinary Shock Team in the Management of Cardiogenic Shock

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Purpose:

To improve outcome of patients coming with refractory cardiogenic shock (RCS)

Method:

90 patients with RCS were managed through a shock team

Team included heart failure cardiologist, an interventional cardiologist, an intensivist, and a cardiothoracic surgeon

Patients were treated by invasive circulatory support

Results :

marginally significant lower 30-day mortality in the SHOCK TEAM group

ICU stay and hospital stay also tended to be shorter in the SHOCK TEAM group

“Door-to-MCS implementation” was not delayed by team management

Conclusion:

A multidisciplinary shock team approach seems to be feasible, practical, and may improve outcomes of patients with RCS.

key points

- Cardiogenic shock is a common clinical syndrome with high mortality
- Advanced technology can improve survival, and also increase the complexity of CS care
- Multispecialty team is recommended to appropriately and efficiently apply and monitor the various treatment options in CS care
- Further research is needed to determine the optimal structure and function of the CS team and to test its clinical effectiveness

Thank You