

A Targeted Management Approach to Cardiogenic Shock



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KEYWORDS

- Cardiogenic shock • Hemodynamics • Temporary mechanical support
- Intraaortic balloon pump • Coronary revascularization

KEY POINTS

- Acute coronary syndrome remains the leading cause of cardiogenic shock. In-hospital mortality in cardiogenic shock ranges from 40% to 50%.
- Timely transfer to a tertiary or quaternary medical center with critical care management, mechanical circulatory support, and multidisciplinary team-based care is necessary to achieve good clinical outcomes.
- Coronary revascularization is the mainstay of treatment for cardiogenic shock. Aggressive, hemodynamically guided medical management with continuous assessment of hemodynamic goals and end-organ function is recommended.
- Mechanical circulatory support is often necessary. Multidisciplinary team-based decision making should drive the choice of mechanical support device and monitoring for need for escalation of therapy.
- Durable mechanical circulatory support may be necessary in suitable candidates once hemodynamic stabilization is achieved.

INTRODUCTION

Cardiogenic shock is a primary cardiac syndrome, characterized by a low cardiac output state that deranges cardiac homeostasis resulting in sustained tissue hypoperfusion (>30 minutes), a very high morbidity and in hospital mortality of more than 60%.¹ Clinical criteria include hypotension with a systolic blood pressure of less than 90 mm Hg or pharmacologic intervention or mechanical support to maintain systolic blood pressure of 90 mm Hg or greater, and cool extremities or multiorgan failure

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characterized by urine output of 30 mL/h or less, mental status changes, and lactic acidosis. Although not required, hemodynamic measurements can help to diagnose cardiogenic shock. Hemodynamic criteria include a depressed cardiac index (≤ 2.2 L/min/m²) and an elevated pulmonary capillary wedge pressure (PCWP) (≥ 15 mm Hg). Rapid diagnosis, timely referral to a tertiary or quaternary medical facility, and shared decision making among a multidisciplinary team of specialists including interventional cardiologists, advanced heart failure specialists, cardiac surgeons, and cardiac intensivists is needed to achieve the best clinical outcomes for every patient.¹ Despite advances in critical care management, reperfusion therapy, and mechanical circulatory support, mortality in cardiogenic shock remains frustratingly high.

ETIOLOGY

The etiologies of cardiogenic shock are listed in **Box 1**. The most common cause of cardiogenic shock, affecting more than 80% of the patients is myocardial dysfunction from acute myocardial infarction with loss of at least 40% of left ventricular (LV) mass or loss of less than 40% LV mass with recurrent, sustained, and refractory ventricular arrhythmias. The prevalence of cardiogenic shock from acute myocardial infarction has continued to increase over the past decade with no change in clinical outcomes. Coexistent or isolated right ventricular (RV) infarction or development of mechanical complications such as papillary muscle rupture with acute mitral regurgitation, LV free wall rupture, or acute ventricular septal defect frequently results in cardiogenic shock. It remains the leading cause of in-hospital mortality after an acute myocardial infarction. Other disorders leading to severe impairment of myocardial function such as acute decompensation of chronic heart failure, acute myocarditis, peripartum cardiomyopathy, or stress-induced Takotsubo cardiomyopathy can result in cardiogenic

Box 1

Etiology of cardiogenic shock

A. Myocardial disease

- Acute myocardial infarction
 - Greater than 40% loss of LV mass
 - Less than 40% loss of LV mass with recurrent, refractory arrhythmia
 - RV infarction
 - Mechanical complication (papillary muscle or free wall rupture, VSD)
- Acute decompensated heart failure
 - Chronic heart failure with acute decompensation
 - Initial presentation of acute heart failure (myocarditis, peripartum CM, Takotsubo CM)
- Postcardiotomy shock
- Miscellaneous (dynamic LVOT obstruction, myocardial depression in sepsis, myocardial contusion)

B. Valve disease

- Stenosis, regurgitation, or prosthetic valve failure

C. Electrical disease

- Bradyarrhythmia or atrial/ventricular tachyarrhythmia

D. Extracardiac disease

- Constrictive pericarditis, cardiac tamponade, pulmonary embolism

Abbreviations: CM, cardiomyopathy; LV, left ventricular; LVOT, left ventricular outflow tract; RV, right ventricular; VSD, ventral septal defect.

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