Current Approach to Cardiogenic Shock

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Abstract

Cardiogenic shock is often seen in acute myocardial infarction, with a very high mortality rate. Early treatment of the underlying etiological cause contributes to a decrease in mortality. A multidisciplinary team approach is required in patients with cardiogenic shock. This mini review includes a brief approach to cardiogenic shock that will contribute to diagnostic and therapeutic approaches.

Keywords: cardiogenic shock, mortality, multidisciplinary approach

Introduction

Cardiogenic shock is still one of the common causes of mortality. Cardiogenic shock is caused by a severe decrease in myocardial performance resulting in end-organ hypoperfusion, hypoxia, and decreased cardiac output [1]. The most common of these causes is acute myocardial infarction with a rate of 81% [2]. Despite advances in reperfusion and percutaneous mechanical support devices, the mortality rate of cardiogenic shock is 25-50% [3]. Due to this high mortality rate, we presented this article on the current approach to cardiogenic shock in order to contribute to the literature.

Definition

According to the American Heart Association (AHA) and the European Heart Association, cardiogenic shock is defined as critical end-organ hypoperfusion due to cardiac dysfunction [4, 5]. According to various guides and studies; Systolic blood pressure <90 mmH for more than 30 minutes or systolic blood pressure 90mmHg< with vasopressor support, cold extremities, urinary output <30ml / hour, cardiac index <2.2 and pulmonary capillary wedge pressure 15mmHg<, serum lactate level 2mmol / L< and mental status changes are signs and symptoms suggestive of cardiogenic shock [6-8]. In SHOCK, IABP-SHOCK 2, and IMPRESS studies, no difference was found between patients who underwent revascularization and those who received medical treatment in terms of all-cause mortality in patients who developed cardiogenic shock due to acute myocardial infarction [6-8].

Epidemiology

Cardiogenic shock is seen in 5-10% of patients with acute coronary syndrome. Cardiogenic shock is seen in 5-10% of patients with ST-elevation myocardial infarction, while 2-3% of patients with non-ST-elevation myocardial infarction experience cardiogenic shock [9]. The risk of developing cardiogenic shock in ST segment elevation myocardial infarction is twice that of non-ST segment elevation myocardial infarction. It is more common in people over 75 years of age or in women. 6-12-month mortality is 50% in patients with cardiogenic shock [10, 11].

Etiology and Risk Factors

Acute myocardial infarction (mechanical complications, left ventricular pump dysfunction), end-stage cardiomyopathy, myocarditis, myocardial contusion, prolonged cardiopulmonary bypass, severe myocardial depression causing septic shock, hypertrophic cardiomyopathy, aortic stenosis, mitral stenosis, left atrial myxoma, acute mitral regurgitation and acute aortic regurgitation are the causes of cardiogenic shock [12, 13]. Advanced age, diabetes, anterior myocardial infarction, peripheral vascular disease and cerebrovascular disease are risk factors that play a role in the development of cardiogenic shock [14, 15].

Pathogenesis

Decrease in cardiac output, decrease in stroke volume, decrease in systemic perfusion, hypotension, decrease in coronary perfusion pressure, compensatory vasoconstriction, fluid accumulation, ischemia, progressive myocardial dysfunction and death due to systolic cardiac dysfunction can be seen [16].

Vasodilatation is seen due to mechanisms such as systemic inflammation, inflammatory cytokines and inducuble nitric oxide synthase (INOS). Subsequently, systemic vascular resistance decreases. Following this situation, a decrease in coronary perfusion pressure and a decrease in systemic perfusion are observed [17].

If cell death occurs in the ischemic myocardium, functions do not return. If the myocardial stunning segment is reperfused and inotropic support is provided, the functions will return. If reperfusion is performed to the hiberne myocardial segment and if inotropic support is provided, the functions return [16].

Diagnostic Evaluation

History, physical examination, electrocardiography, echocardiography, laboratory tests, chest X-ray, and pulmonary artery catheterization should be performed for diagnosis [15]. Echocardiography plays an important role in the evaluation of systolic performance, determination of regional wall motion abnormalities, exclusion of mechanical causes of shock, determination of papillary muscle rupture, determination of ventricular septal rupture, determination of free wall rupture, tamponade and right ventricular infarction. Pulmonary artery catheterization plays an important role in determining the hemodynamic criteria of cardiogenic shock [18].

Classification of Cardiogenic Shock

Diamond Forrester classification is used in cardiogenic shock in acute myocardial infarction. In Diamond Forrester classification, classification is made according to cardiac index and pulmonary capillary wedge pressure. If the cardiac index (CI) is> 2mm / min, pulmonary capillary wedge pressure (PCWP) is <18mmHg, it is stage 1 (mortality 3%). If CI> 2; If PCWP> 18mmHg, it is stage 2 (mortality 9%). If CI <2, PCWP <18, it is stage 3 (mortality 23%). If CI <2, PCWP> 18, it is stage 4 (mortality 51%) [19, 20].

Treatment

All coronary vessels with severe stenosis in cardiogenic shock due to acute coronary syndrome should be revascularized. If the oxygen saturation is below 90%, 5-7 l / min oxygen is given. Vasopressor and inotropic drugs such as phenylephrine, epinephrine, norepinephrine, dopamine, vasopressin, dobutamine and levosimendan are used in patients with cardiogenic shock [8]. Although there is no large-scale data in the literature showing the superiority of any vasopressor over another, the mortality rate in subgroup analyzes of patients with cardiogenic shock in the SOAP 2 study was found to be lower with norepinephrine than dopamine [21]. In hypovolemia, 250-500ml crystalloid infusion is made. In addition, hemodynamic monitoring is performed with pulmonary artery catheterization. An intra-aortic balloon pump is used in cardiogenic shock due to mechanical complications in acute myocardial infarction. Intraaortic balloon pump is a temporary mechanical circulation support device. Impella, Tandem Heart, Veno-arterial extracorporeal membrane oxygenation are active mechanical circulation support devices [22]. These devices reduce end diastolic wall stress and pulmonary capillary wedge pressure.

Conclusion

In conclusion, cardiogenic shock is a diagnosis that requires a multidisciplinary approach with a still very high mortality rate. Urgent and aggressive treatment is required in patients with cardiogenic shock.

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