



THE WHOLE TRUTH ABOUT CARDIOGENIC SHOCK

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ABSTRACT

Over the past few decades, the mortality rate in acute coronary syndrome (ACS) has sharply decreased: from 10.4% in 1990 to 6.3% in 2006 [1]. The increase in survival rates among patients with ACS, in particular, may be associated with advances in drug therapy and interventional interventions [2-4]. Many of these treatment options are aimed at the treatment of cardiogenic shock, a relatively frequent complication of ACS, with a mortality rate ranging from 50% to 80% [2]. Despite the need for detailed, evidence-based treatment algorithms for this population of critically ill patients, the existing data is insufficient to create them. The article describes the pathophysiology of cardiogenic shock, structures the information that must be taken into account when choosing treatment, and lists the achievements of modern clinical practice.

Cardiogenic shock is defined as a state of hypoperfusion and dysfunction of peripheral organs that develop due to a significant decrease in cardiac output.

Most often, the causes of its development are acute myocardial infarction (MI) and left ventricular insufficiency, less often shock can be provoked by acute dysfunction of the valvular apparatus and aortic dissection (both are urgent surgical conditions).

For patients in a state of cardiogenic shock, an assessment of the possibility of urgent reperfusion treatment, including coronary artery bypass grafting and percutaneous coronary intervention (PCI), is required. For patients with cardiogenic shock who require support with a pressor drug, norepinephrine is the preferred drug. Dobutamine and milrinone are second-line adjuvants that can aggravate hypotension if they are used as first-line therapy.

In an emergency situation, as a temporary means to improve hemodynamics before the start of the main line of therapy, it may be necessary to use an intra-aortic balloon pump (IABP) and a percutaneous installation of a left ventricular auxiliary circulation apparatus (LVAD). The optimal definition of cardiogenic shock is a state of heart failure that leads to a decrease in cardiac output and, as a consequence, hypo perfusion and dysfunction of peripheral organs. The defining characteristics of cardiogenic shock are presented in.

Previously, this pathology was diagnosed by catheterization of the pulmonary artery, but now noninvasive echocardiography is increasingly used [5, 6]. In addition to hypotension, clinical signs may be a decrease in limb temperature, a decrease in urine formation, skin moisture and neuropsychic changes.

Cardiogenic shock also implies dysfunction of the left and or right ventricle. There are many causes of ventricular failure, which include the acute phase of MI, myocarditis/pericarditis, cardiomyopathy, acute or chronic impairment of valve function, delaminating aortic aneurysm, heart injury and decreased myocardial contractility in septic shock [7]. Mechanical reasons cardiogenic shock (including valve rupture and aortic aneurysm) are true surgical emergencies that require urgent diagnosis and transportation of the patient to the surgical unit. The prognosis of these conditions is often unfavorable [8]. Nevertheless, the most common cause of cardiogenic shock remains ventricular dysfunction, which develops in ACS, with damage to the coronary arteries of the left ventricle [7]. This article focuses on THEM as the cause of cardiogenic shock, as well as various treatment options and the possibility of their use in the course of emergency medical care.

The primary link of pathogenesis is mediated by IT, which leads to the development of reversible or irreversible ischemia and, as a consequence, damage to the left ventricle (LV). As a result, the level of coronary perfusion decreases, which leads to a decrease in cardiac output, and then to hypoperfusion, triggering the release of catecholamines, causing an increase in contractility and an increase in blood pressure. This, in turn, increases the myocardial need for acid [5]. As a result, there is a decrease in the level of myocardial blood supply against the background of increased myocardial oxygen demand, which forms a vicious circle, which can manifest itself in the form of a sharp deterioration in the clinical condition of the patient.

Right ventricular MI (RV) is accompanied by lower wall ischemia in 50% of cases and usually does not develop in the absence of left ventricular MI. Hemodynamic stability in pancreatic MI is a relative concept; in some patients, this pathology is asymptomatic, while in others severe hypotension and cardiogenic shock are observed. Pancreatic MI is much more often complicated by arrhythmias, including complete atrioventricular or sinoatrial blockages [9]. When assessing the condition of a patient with lower wall ischemia, it is important to consider the possibility of its spread to the pancreas. When registering an electrocardiogram, it may be necessary to use the right precordial leads in order to assess the level of ischemia spread in lower wall MI. ST segment elevation in the V4R lead by more than 1 mm, according to previously obtained data, is sensitive in 100% of cases and specific in 87% of cases in relation to right ventricular infarction [9].

Risk factors correlate with an increased mortality rate in cardiogenic shock and MI, including advanced age (>75 years), an increase in serum lactate (>6.5 mmol/l) [10]. Indeed, an increase in serum lactate levels was previously indicated as an independent predictor of the development of cardiogenic shock [11]. In addition, the factors of high risk of cardiogenic shock include an unsuccessful attempt at reperfusion and the preceding one [12].

Revascularization makes it possible to cope with the pathological process by restoring coronary blood flow in order to achieve perfusion of still life-capable myocardial tissue. Time is a critical factor. Experimental animal models have shown that about 50% of the myocardial tissue that can be saved is lost within the first hour after occlusion of the coronary artery, another 2/ - within 3 hours [2]. In the recently published NICE manual, patients with MI with

ST segment elevation and the presence of cardiogenic shock, who received within 12 hours from the onset of symptoms, are recommended to perform coronary angiography with primary PCI [13]. In patients admitted more than 12 hours after the development of MI with ST segment elevation, the probability of a positive effect of such procedures may be low, and therefore doctors are recommended to make a decision on the appointment of therapeutic measures on an individual basis [13]. The SHOCK study compared the results of coronary artery bypass grafting and PCI in patients with cardiogenic shock during the acute phase of MI. The results showed that both treatment options approximately equally increase the survival rate of patients [14].

Patients with the described pathology need an emergency examination by a cardiologist and/or a cardio surgeon to assess the feasibility of reperfusion. Prior to the examination, it is necessary to consider the possibility of prescribing pharmacological or invasive reperfusion. The drugs most commonly used in the treatment of cardiogenic shock include inotropic agents that increase the contractility of the myocardium. Examples of inotropic agents are listed in Table. 2; among them are digoxin, dopamine, dobutamine, norepinephrine, milrinone and levosimendan. The inotropic effect of digitalis extract has been known for more than 200 years. Digoxin, one of the most common cardiac glycosides, inhibits the work of the sodium-potassium ATPase, increasing the concentration of calcium in the cell and the contractility of the myocardium. It is noteworthy that it has little or no effect on systemic arterial pressure and kidney function, and also has multiple protective and neurohormonal effects [15]. However, despite the relief of symptoms and improvement of hemodynamic parameters, there is no evidence in favor of its effect on the level of mortality from all causes against the background of the development of cardiac insufficiency [16]. Dopamine, dobutamine and norepinephrine are adrenergic agents prescribed for the treatment of cardiogenic shock. Dopamine acts on adrenergic receptors, exerting a positive inotropic effect and increasing the heart rate (HR). In high doses, it leads to peripheral vasoconstriction by activating adrenoreceptors. Dobutamine is a synthetic agent that activates adrenergic receptors without peripheral vasoconstriction and stimulation of the release of endogenous catecholamines. Dobutamine increases cardiac output and reduces, of course, diastolic pressure in the LV, however, its intake can cause hypotension due to unhindered stimulation of peripheral α_2 receptors, in addition, with prolonged infusions, the development of tolerance to taking the drug was observed [17].

Norepinephrine is an endogenous adrenergic agent, the action of which is directed at the receptors. The drug has positive inotropic and chronotropic effects, as well as causes peripheral vasoconstriction. Compared with dopamine in cardiogenic shock, norepinephrine is no less effective in improving hemodynamic parameters. However, taking it reduces the risk of arrhythmias and the mortality rate over a 28-day period [18]. The data obtained indicate that norepinephrine is the preferred first-line adrenergic agent for cardiogenic shock. Milrinone is a non-catecholamine agent that inhibits the destruction of cyclic adenosine monophosphate (AMP) and promotes an increase in intracellular calcium concentration in cardio myocytes. Similarly to dobutamine, milrinone improves contractility and cardiac output with a possible risk of exacerbation of systemic hypotension. There is no evidence that it improves outcomes provided it is prescribed for the treatment of acute congestive heart failure [19]. Agents that increase the sensitivity of the myocardium to calcium, such as

levosimendan, enhance the contractility of the myocardium without a significant increase in the intra-cellular concentration of calcium. It was previously shown that levosimendan increases cardiac output, lactate clearance and reduces the need for norepinephrine in decompensated heart failure [20]. At least one meta-analysis concluded that levosimendan reduces the mortality rate from all causes in a group of patients in critical condition (however, the data are very contradictory) [21]. The SURVIVE study compared the effects of levosimendan and dobutin in acute decompensation of heart failure. Scientists have not revealed any differences in the mortality rate from all causes based on the results of a 6-month study [22]. It should be noted that cardiogenic shock can have an iatrogenic character (up to 75% of all clinical cases do not progress until the patient is admitted to the hospital) [23]. The number of medications, the reception of which leads to an aggravation of the condition of patients with cardiogenic shock in acute MI conditions, includes blockers, angiotensin-converting enzyme (ACE) inhibitors, morphine, nitrates and diuretics

References:

1. Rogers W.J., Frederick P.D., Stoehr E., et al. Trends in presenting characteristics and hospital mortality among patients with ST elevation and non-ST elevation myocardial infarction in the national registry of myocardial infarction from 1990 to 2006. *Am Heart J.* 2008; Vol. 156 (6): 1026–34.
2. Harker M., Carville S., Henderson R., et al. Key recommendations and evidence from the NICE guideline for the acute management of ST-segment-elevation myocardial infarction. *Heart.* 2014; Vol. 100 (7): 536–43.
3. Jernberg T., Johanson P., Held C., et al. Association between adoption of evidence-based treatment and survival for patients with ST-elevation myocardial infarction. *JAMA.* 2011; Vol. 35 (16): 1677–84.
4. O'Flaherty M., Buchan I., Capewell S. Contributions of treatment and lifestyle to declining CVD mortality: why have CVD mortality rates declined so much since the 1960s? *Heart.* 2013; Vol. 99: 159–62.
5. Reynolds H.R., Hochman J.S. Cardiogenic shock: current concepts and improving outcomes. *Circulation.* 2008; Vol. 117: 686–97.
6. Pirrachio R., Parenica J., Rigon M.R., et al. The effectiveness of inodilators in reducing short term mortality among patient with severe cardiogenic shock: a propensity-based analysis. *PLoS One.* 2013; Vol. 8 (8). Article ID e71659.
7. Axler O. Low diastolic blood pressure as best predictor of mortality in cardiogenic shock. *Crit Care Med.* 2013; Vol. 41 (11): 2644–47.
8. Stout K.K., Verrier E.D. Acute valvular regurgitation. *Circulation.* 2009; Vol. 119 (25): 3232–41.
9. Ondrus T., Kanovsky J., Novotny T., et al. Right ventricular myocardial infarction: from pathophysiology to prognosis. *Exp Clin Cardiol.* 2013; Vol. 18 (1): 27–30.
10. Valente S., Lazzeri C., Vecchio S., et al. Predictors of in-hospital mortality after percutaneous coronary intervention for cardiogenic shock. *Int J Cardiol.* 2007; Vol. 114: 176–82.

12. Mavric Z., Zaputovic L., Zagar D., et al. Usefulness of blood lactate as a predictor of shock development in acute myocardial infarction. *Am J Cardiol.* 1991; Vol. 67 (7): 565-8.
13. Sutton A.G., Finn P., Hall J.A., et al. Predictors of outcome after percutaneous treatment for cardiogenic shock. *Heart.* 2005; Vol. 91 (3): 339-44.
14. Carville S., Harker M., Henderson R., et al. Acute management of myocardial infarction with ST-segment elevation: summary of NICE guidance. *BMJ.* 2013; Vol. 347. Article ID f4006.
15. White H.D., Assmann S.F., Sanborn T.A., et al. Comparison of percutaneous coronary intervention and coronary artery bypass grafting after acute myocardial infarction complicated by cardiogenic shock: results from the should we emergently revascularize occluded coronaries for cardiogenic shock (SHOCK) trial. *Circulation.* 2005; Vol. 112 (13): 1992-2001.
16. Тиллоева Ш. Ш., Давлатов С. С. Эффективность и переносимость локсидола в лечение ревматоидного артрита у пациентов старших возрастных групп //Central Asian Journal of Medical and Natural Science. – 2021. – С. 432-436.
17. Тиллоева Ш. Ш. и др. Estimation of the condition of the cardiorespiratory system of patients with the concilation of bronchial asthma and arterial hypertension, effects of complex therapy //Новый день в медицине. – 2020. – №. 2. – С. 227-230.
18. Tillaeva S. S. et al. Currency and diagnostic criteria of rheumatoid arthritis in patients of senior age groups //Asian Journal of Multidimensional Research (AJMR). – 2018. – Т. 7. – №. 11. – С. 184-188.
19. Тиллоева Ш. Ш., Бозоров А. С., Раджабов Р. К. Трансфузиологии. Новые Рекомендации По Переливанию Эритроцитов //Central Asian Journal of Medical and Natural Science. – 2021. – С. 418-422.
20. Тиллоева Ш. Ш. КАЧЕСТВО ЖИЗНИ И ПСИХОЛОГИЧЕСКИЙ СТАТУС БОЛЬНЫХ С ЛЕГОЧНОЙ ГИПЕРТЕНЗИЕЙ И ЭФФЕКТЫ КОМПЛЕКСНОЙ ТЕРАПИИ //Новый день в медицине. – 2020. – №. 4. – С. 701-703.
21. Тиллоева Ш. Ш. и др. Estimation of the condition of the cardiorespiratory system of patients with the concilation of bronchial asthma and arterial hypertension, effects of complex therapy //Новый день в медицине. – 2020. – №. 2. – С. 227-230.
22. Тиллоева Ш. Ш. Изучение Распространения Ревматоидного Артрита В Бухарской Области //Central Asian Journal of Medical and Natural Science. – 2021. – С. 428-431.
23. Тиллоева Ш. Ш. СУРУНКАЛИ ОБСТРУКТИВ ЎПКА КАСАЛЛИГИ БЎЛГАН БЕМОРАЛДАРДА ЎПКА ГИПЕРТЕНЗИЯСИНИ ОЛДИНИ ОЛИШ ВА ДАВОЛАШДА САМАРАЛИ УСУЛЛАР //Евразийский журнал медицинских и естественных наук. – 2023. – Т. 3. – №. 5. – С. 173-180.
24. Тиллоева Ш. Ш. СУРУНКАЛИ ОБСТРУКТИВ ЎПКА КАСАЛЛИГИ БЎЛГАН БЕМОРАЛДАРДА ЎПКА ГИПЕРТЕНЗИЯСИНИ ОЛДИНИ ОЛИШ ВА ДАВОЛАШДА САМАРАЛИ УСУЛЛАР //Евразийский журнал медицинских и естественных наук. – 2023. – Т. 3. – №. 5. – С. 173-180.
25. Idiyevna S. G. Discussion of results of personal studies in the use of fmil therapy in the treatment of trauma to the oral mucosA //European Journal of Molecular medicineVolume. – Т. 2.
26. Idiyevna S. G. THE EFFECTIVENESS OF THE USE OF MAGNETIC-INFRARED-LASER THERAPY IN TRAUMATIC INJURIES OF ORAL TISSUES IN PRESCHOOL CHILDREN

//Academic leadership. ISSN. – T. 15337812.

27. Sharipova G. I. Light and laser radiation in medicine //European journal of modern medicine and practice. – 2022. – T. 2. – №. 1. – C. 36-41.

28. Idievna S. G. THE EFFECT OF DENTAL TREATMENT-PROFILACTICS ON THE CONDITION OF ORAL CAVITY ORGANS IN CHILDREN WITH TRAUMATIC STOMATITIS //Tibbiyotdayangikun» scientific-abstract, cultural and educational journal.-Bukhara. – 2022. – T. 5. – №. 43. – C. 103-106.

29. Idievna S. G. CHANGES IN THE CONTENT OF TRACE ELEMENTS IN THE SALIVA OF PATIENTS IN THE TREATMENT OF PATIENTS WITH TRAUMATIC STOMATITIS WITH FLAVONOID-BASED DRUGS //Journal of research in health science. – T. 6. – C. 23-26.

