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CONTRAST-INDUSED NEPHROPATY

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Abstract: All over the world, including in Uzbekistan, coronary heart disease is becoming an increasingly pressing medical and social problem [2]. Today, CHD is one of the most common causes of disability and mortality throughout the world [4]. Considering this fact, the fastest possible determination of patient management tactics is required already at the emergency room stage [5].

Heart and vascular diseases are the leading cause of mortality in industrialized countries [1]. For adequate assessment, treatment and prevention of cardiovascular diseases, high-quality and accurate diagnostics, including visualization of the heart and blood vessels, are of great importance. Intravenous or intraarterial administration of radiocontrast agents allows you to accurately determine the anatomy of blood vessels, the nature and location of lesions in them, and evaluate the characteristics of the blood supply to various organs and tissues. Without such information, modern treatment would simply be impossible. Selective angiography and computed tomography with the introduction of contrast agents are used everywhere in practical medicine. Therefore, safety issues for a study or intervention using KB become important. Despite the significant progress made in the development of KBs, they have a number of adverse effects, incl. nephrotoxicity. Prevention of nephrotoxic effects of KB, so-called. contrast-induced nephropathy remains an urgent problem, since it is known that CIN is often a harbinger of chronic renal failure, which worsens the prognosis [6]. Active use of X-ray computed tomography with intravenous administration of KB at the diagnostic stage increases not only the total radiation dose, but also nephrotoxicity.

Key words: coronary heart disease, radiocontrast agents, coronary angiography, nephrotoxicity, contrast-induced nephropathy, chronic kidney disease.

Contrast-induced nephropathy is an iatrogenic nephropathy that occurs after intravascular administration of an iodinated radiocontrast agent for diagnostic purposes, after excluding other alternative causes [7]. The use of iodine-containing X-ray contrast agents in specialized medical institutions today is an integral component of a number of therapeutic and diagnostic measures [8]. In order to visualize the coronary arteries of the heart and perform myocardial revascularization, patients with various forms of CAD undergo coronary angiography and percutaneous coronary interventions using RCS. Percutaneous coronary interventions are the leading method for diagnosing and treating coronary heart disease [9]. Like most invasive procedures, interventional procedures on the coronary arteries are associated with the risk of complications: patient death, acute myocardial infarction, acute cerebrovascular accident, CIN, complications at vascular access sites (bleeding, occlusion, dissection, pseudoaneurysm and arteriovenous aneurysm), allergic reactions [10]. Every year, the number of patients receiving high-tech X-ray endovascular care is growing, the consumption of X-ray contrast agents is increasing, and the incidence of contrast-induced nephropathy is correspondingly increasing (18). Due to the fact that contrast agents used

during coronary angiography are eliminated primarily by the kidneys, it is extremely important to assess their initial function as early as possible to determine the need for periprocedural preparation of the patient [20]. The relevance of the problem of CIN is due to the increase in the number of radiosurgical procedures, most of which are PCI, representing a key strategy for the management of patients with CAD [29]. A significant number of cardiac patients suffer from nephropathy, which develops as a result of the administration of contrast agents, in particular, with increasingly more frequent coronary angiography and PCI. Despite the large number of new techniques for coronary imaging, the "gold standard" is precisely studies and interventions using intra-arterial injection of a contrast agent containing iodine. In turn, CAD is the leading cause of death in patients with kidney diseases, the number of which is growing every year in all countries of the world, especially due to the aging population. Thus, in 2015, the number of such patients amounted to 323 million, which is 27% more than in 2005 [25]. The risk of developing CIN due to the administration of contrast agents is quite low in the general population [17]. However, in some cases the likelihood of developing this complication becomes very high [38], [21], in particular, after interventions in patients with cardiovascular pathology. In the 1990s, it was demonstrated that in patients with multiple risk factors (both patient and intervention), the incidence of CIN could be as high as 50% [25]. Data on the prevalence of CIN after PCI are numerous but highly controversial [16]. , which is explained by the use before 2012 (before the first expert recommendations) of various criteria for the diagnosis of nephropathy, the heterogeneity of patient populations, and the difference in the approaches and contrast agents used for PCI. The results of studies in the field of CIN indicate its unfavorable prognostic value [23]. The development of this complication of angiographic interventions is associated with increased mortality [27, 34] and more frequent readmissions [29]. It is also important to remember the economic damage caused by this pathology to the healthcare system due to disability of the population, mortality, and transition of the disease to terminal kidney disease requiring hemodialysis. Currently, however, there is no consensus on whether CIN is a marker of adverse events or a risk factor for them. A large number of studies have demonstrated that in clinical practice, patients with CKD tend not to receive angiographic care and revascularization with contrast injection due to fears of developing CIN [14]. This feature certainly influences the documented incidence of this pathology and its impact on prognosis, especially with regard to renal outcomes, such as transition to hemodialysis and the development of end-stage renal disease. The problem of diagnosing and treating cardiovascular diseases over the past decades remains one of the most pressing problems in global and domestic healthcare. The interventions themselves are becoming more complex, often multi-stage, using a large volume of CVs. CIN is the third most common cause of AKI in the hospital (second only to decreased renal perfusion and the use of nephrotoxic agents) and occurs in 3-19% of patients undergoing PCI [23]. CIN is a common concomitant condition in patients with CAD [33]. Moreover, even a short-term transient increase in serum creatinine is associated with an increase in the length of the patient's stay in intensive care and the hospital in general [34]. In addition, reduced renal function limits the use of many drugs for the treatment of CAD, which necessitates the search for additional risk factors (RFs) for kidney damage in these patients in order to prevent its development [28]. Endovascular interventions, in which the risk of developing CIN is increased, are increasingly performed in severely ill patients of the older age group with multifocal atherosclerosis, diabetes mellitus, arterial hypertension, heart failure, underlying renal impairment, and concomitant use of nephrotoxic drugs, the incidence of CIN can increase up to 25% [15]. It is important to identify the patient population at high risk of worsening renal function as early as possible. A high frequency and unfavorable prognostic significance of CIN after PCI have been established, which determines the need to stratify patients with upcoming PCI according to the risk of developing CIN and implement preventive measures. Modern science does not have sufficient data on the significance of CIN and its impact on the prognosis of patients with CAD, and therefore further study of this issue can be considered an important determinant of cardiovascular risk assessment. The incidence of subsequent development of chronic kidney disease in patients with CAD is also unknown [12]. Studying the prognostic value of CIN in patients with CAD, searching for biomarkers of

early response, improving the algorithm for managing this category of patients at different stages of observation will reduce the risk of developing recurrent cardiovascular events (CVE), progression of chronic heart failure (CHF) and the development of chronic kidney disease.

The most common pathology leading to aggravation or development of CVD is kidney disease [3]. The kidneys are one of the main target organs for CAD. The prevalence of CKD has shown an increasing trend over recent decades [24]. According to many epidemiological studies, it has been established that in the presence of chronic kidney disease (CKD), compared with the general population, there is a high risk of CVD, and their course is more severe [13]. At the same time, the presence of diseases of the cardiovascular system causes a high risk of development and progression of CKD [34]. It has been established that patients with CKD more often die from cardiovascular complications (CVC) without surviving to the end stage of chronic renal failure (CKD) [21]. The unity of risk factors and the common pathogenetic pathways of damage to cardiovascular tissue and kidneys were usually combined into the concept of the cardiorenal continuum, and its manifestations were designated by the term cardiorenal syndrome (CRS) [30]. The relationship between the heart and kidneys is important for the regulation of their functions and control of hemodynamics. Based on epidemiological and clinical studies, a close relationship has been established between the severity of renal dysfunction, the risk of overall mortality and the occurrence of cardiovascular events [31]. Every 10 ml/min/m2 decrease in glomerular filtration rate (GFR) correlates with a 7% increase in cardiovascular mortality. As is known, there are bidirectional interactions between the heart and kidneys, and changes in hemodynamics in one of the organs can affect the hemodynamics of the other organ [34]. An increase in life expectancy is accompanied by an increase in comorbidity (a combination of several concomitant pathologies), including CKD and CAD[11]. Given the increasing prevalence of CKD, it is predicted that this pathology will become the fifth cause of lost years of life in the population by 2040 [33]. CKD is observed in 11–13% of the general population, the prevalence increases significantly in the presence of cardiovascular diseases and in the older age group – up to 36–52.7%[29].

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