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Ischemic Heart Disease and Risk of Development of Cognitive Disorders or Dementia (Review)

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ABSTRACT

An increase in life expectancy in Europe and Russia leads to an increase in the number of patients of older age groups with Cardiovascular diseases (CVD). The incidence of coronary heart disease (CHD) and the presence of cognitive impairment (CI) and dementia (DM) increase with age and have common risk factors. It should be noted that atherosclerosis and CHD are associated with brain ischemia and specific lesions. Research interest in the relationship between cardiovascular disease and dementia has more often focused on cerebrovascular disease than on CHD. It is important to note that it is the studies in middle-aged and CHD patients, as well as the links with cognitive impairment that are important. Since more often, coronary heart disease manifests itself in middle age. This literature review presents data from studies aimed at studying the relationship of coronary heart disease and cognitive impairment, new research on the relationship between coronary artery disease, the prevalence of the disease and poor cognitive status. Studies are presented on the study of a cohort of patients of middle, elderly and senile age. The research data on the study of the dependence of atherosclerosis, age, various forms of coronary heart disease (stable coronary heart disease, acute myocardial infarction, revascularization by percutaneous coronary intervention and coronary artery bypass grafting) with the course and clinical manifestations of cognitive impairment and dementia, complications and severity of cognitive impairment are described. Studies aimed at linking coronary heart disease and cognitive impairment require further study to determine the mechanisms of their development and progression and identify new strategies in preventive medicine.

Keywords: Coronary heart disease (CHD), Atherosclerosis, Cognitive impairments, Dementia, middle age, old age and senile age patients, Acute myocardial infarction(AMI), Percutaneous coronary intervention (PCI), Coronary artery bypass grafting (CABG).

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INTRODUCTION

An increase in life expectancy in Europe and in Russia leads to an increase in the number of patients of older age groups with diseases of the cardiovascular system (CVD). Of interest are studies on the dependence of atherosclerosis, age, various forms of coronary heart disease (stable coronary heart disease, acute myocardial infarction, revascularization by percutaneous coronary intervention and coronary artery bypass grafting) with the course, clinical manifestations, complications and severity of cognitive impairment.

MAIN PART

The incidence of coronary heart disease and the presence of cognitive impairments and dementia increase with age and have common risk factors. Moreover, the established fact is interesting that the biology of aging and the pathophysiology of CVD partially coincide, which leads to the coexistence and synergy of these two problems in modern medicine. IHD is the leading cause of death worldwide (1). The main etiological reason affecting the vascular system is the atherosclerotic process, which affects the arterial bed due to the formation of atheromatous plaques (2).

The term vascular cognitive impairment was introduced at the beginning of the new millennium and refers to the contribution of vascular pathology to any severity of cognitive impairment, ranging from subjective cognitive decline and mild cognitive impairment to dementia.

IHD has common risk factors with cognitive impairment. These factors include age (men over 45 years old, women 55 years old), gender (men), family history of CVD. Common modifiable risk factors include elevated low-density lipoprotein cholesterol, hypertension, metabolic syndrome, diabetes mellitus, smoking, obesity, physical inactivity, mental stress, depression, excessive alcohol consumption (3). A recent analysis of studies on modifiable risk factors revealed several works on cardiac diseases, most of which reported a higher risk of cognitive impairment or dementia in this category of patients (4). It has been proven that individuals with atrial fibrillation have a 36% increased risk of cognitive impairment or dementia (5,6).

For the first time in a 1990 study by Aronson et al. a significant association between MI and dementia and a possible mild cognitive impairment / dementia was found (7). Later Ross et al. in his work showed that IHD is a significant predictor of vascular dementia (8).

It seems important that the relationship between coronary heart disease and the risk of dementia cannot be explained only by general factors of cardiovascular risk. To a greater extent, in patients with coronary artery disease, pathogenesis plays a role, the basis of which is atherosclerosis, which may be associated with diseases in which it takes part (atrial fibrillation, heart failure), which has been proven to be associated with cognitive impairment or dementia (9,10).

In addition, atherosclerosis of the coronary and brachiocephalic arteries, including the magistral head arteries, and as a result of chronic heart failure and chronic cerebral ischemia, lead to cerebrovascular changes (11), white matter damage and cerebral infarction (12), which, in turn, It is associated with a decrease in cognitive functioning and the risk of dementia (13). However, IHD alone cannot be associated with cognitive functions, but effects on the brain (eg, cognitive impairment of vascular origin) may be associated with underlying atherosclerosis, which increases both the risk of IHD and dementia (14).

In a study of cognitive impairment in a population of patients> 65 years of age with Non-ST-segment elevation (NSTE) acute coronary syndromes (ACS), which underwent

coronary angiography with the intention to revascularize as necessary. Cognitive function was evaluated at baseline and 1 year after coronary angiography using the Montreal Cognitive Assessment Test (MMSA). In the initial state, almost half of the patients in the study revealed at least mild cognitive impairment. To a lesser extent, these patients received revascularization after angiography, but were more prone to adverse events (death, non-fatal myocardial infarction, Repeat percutaneous coronary revascularization, stroke or significant bleeding (Massive bleeding)) for 1 year than patients without cognitive impairment. When reevaluating cognitive abilities within 1 year of observation, more than a third of patients had a cognitive decline (MMSA test score decreased by ≥2 points).

In the discussion on the value of population-wide screening for asymptomatic carotid artery stenosis, reliable prevalence estimates are crucial (15). It has been established that carotid arteriosclerosis with the formation of plaques and the formation of asymptomatic stenosis of the carotid artery (ACAS), causes hypoperfusion of the brain. Cerebral hypoperfusion negatively affects many cognitive function. It has been proven that in older people with a reduced carotid artery diameter of 50% or more, there are problems with motor activity and cognitive impairment that increase the risk of falls (16).

The ADAMS study (Aging, Demographics and Memory Study) showed that the prevalence of cognitive impairment without dementia is about 22% in people aged ≥71 years. When assessing cognitive impairment in the general population, the data ranged from 1% to 29%, largely depending on the definition of cognitive impairment and the sampling methods used (17,18). A recent systematic review revealed a 45% increased risk of cognitive impairment in patients with established coronary heart disease. So, in the Framingham study it was found that an increase in systolic and diastolic blood pressure for every 10 mm Hg in middle-aged people without a stroke, a history of is associated with poorer indicators of cognitive function in general, memory and attention (19,20).

Assessing a patient's weakness, a key component of which is cognitive impairment, should be routine in preprojective evaluations of patients with coronary heart disease. Observational studies conducted to date have shown that fragile patients have a higher risk of functional decline, serious adverse coronary events, and mortality after cardiac surgery (21-23). As treatment options continue to evolve, it is becoming increasingly important to objectively evaluate patient-oriented results in this growing patient population.

Research interest in the relationship between cardiovascular disease and dementia has more often focused on cerebrovascular disease than on CHD. Most studies on coronary heart disease and its relationship with cognitive dysfunction have studied patients undergoing revascularization. However, in studies aimed at studying the relationship between coronary heart disease, a common disease, and poor cognitive status, cohorts of elderly and senile patients were studied.

It is important to note that it is the studies in middle-aged and CHD patients, as well as the links with cognitive impairment that are important. Since more often, coronary heart disease manifests itself in middle age. Dementia occurs at a later age, but it is increasingly recognized that there is a prolonged preclinical phase characterized by progressive neuropathological changes, which then become clinically significant. This manifests itself as a manifestation of cognitive deficit or dementia. Research results show that even among middle-aged people, IHD is associated with poor cognitive activity, and some data indicate a more significant dependence on the duration of IHD disease (24).

It should be noted that atherosclerosis and CHD are associated with brain ischemia and specific lesions. The data obtained on the association of the affected brain volume, measured using magnetic resonance imaging, and cognitive function in patients with coronary artery disease who underwent revascularization of the coronary arteries showed. That patients with coronary artery disease had less total brain volume and poorer cognitive function than patients without coronary artery disease.

It has been established that cognitive decline coexists in parallel with IHD, and cognitive impairment is a common complaint in these patients. Impaired cognitive function in patients is a predictor of a higher risk of mortality and a greater dependence on other people in everyday life. It was also determined that an increase in the rate of cognitive decline was associated with the rapid development of dementia and a sharp decrease in the quality of life of these patients. Studies on the cognitive function of patients with coronary artery disease are designed to better identify individuals at high risk of decreased cognitive function.

Atherosclerosis is an inflammatory chronic disease that affects arterial vessels and leads to vascular diseases such as stroke and myocardial infarction. A link has been established between atherosclerosis and the risk of neurodegeneration, in particular with vascular cognitive impairment and dementia. Systemic atherosclerosis increases the risk of cognitive impairment and dementia, causing cerebral infarction. This occurs through systemic or local inflammatory factors that underlie both atherosclerosis and cognitive functions. A Rotterdam study showed a higher incidence of dementia in patients with myocardial infarction (25,26). A study of aging in the Bronx showed that women over 75 with a history of MI are more likely to develop dementia than women without a history of MI. In elderly patients, compared with young people, acute coronary syndrome without an ST segment elevation is more often observed. Assessment of the prevalence of cognitive impairment and predictors of cognitive decline in elderly patients with acute coronary syndrome without ST segment elevation undergoing invasive care showed that older patients who underwent invasive treatment of acute coronary syndrome without ST segment elevation have a high prevalence of undetected cognitive impairment on baseline. Recurrent myocardial infarction is independently associated with cognitive decline after 1 year (27-29).

With multivascular damage to the coronary arteries, patients are shown myocardial revascularization by aorto-coronary artery bypass grafting. The number of major heart operations and procedures is constantly growing, as advances in surgical procedures, medical technology and clinical understanding allow more "high-risk" patients to

undergo invasive treatment. A growing number of elderly patients undergo major operations, as a result of which possible postoperative complications arise, exacerbate surgical risk factors. In a large percentage of patients with increasing age, the existing cognitive impairment of varying severity of ischemic and vascular origin was determined. At the same time, coronary artery bypass surgery may additionally negatively affect the health status of patients, causing a deterioration in cognitive functions. Cerebral ischemia in the perioperative period is a major risk factor for stroke, encephalopathy, and decreased cognitive function after cardiothoracic surgery. After coronary artery bypass grafting, both stroke and encephalopathy can lead to poor patient outcomes and increased mortality (30).

CONCLUSION

Studies aimed at linking coronary heart disease and cognitive impairment require further study to determine the mechanisms of their development and progression and identify new strategies in preventive medicine.

CONFLICT OF INTEREST

None

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