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MODERN ORGANIZATION ASPECTS OF THE PREVENTION OF ISCHEMIC STROKE IN PATIENTS WITH EXTRACRANIAL CAROTID STENOSIS

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Abstract

Stroke is the second leading cause of death and the third leading cause of disability globally. This literature review described risk factors and diagnostic aspects of ischemic stroke prevention. Carotid stenosis and occlusion is a treatable cause of ischemic stroke, which can be diagnosed by duplex scanning of the brachiocephalic arteries. The reasons for the low effectiveness of preventive measures for ischemic stroke are the incomplete collection of anamnesis for risk factors that affect the clinical prognosis, the low use of modern diagnostic methods by primary health care general practitioners in the screening of patients.

Ұйқы артериясының экстракраниалды стенозы бар науқастардағы ишемиялық инсультты алдын алуды ұйымдастырудың заманауи шаралары

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Мүдделер қақтығысы:
Авторлар мүдделер қақтығысының жоқтығын мәлімдейді

Түйінді сөздер:
ұйқы артериясының стенозы, экстракраниалды ұйқы артериясы, ишемиялық инсульт, ми қанайналымының жедел бұзылысы, диагностикасы

Тұжырым

Инсульт дүние жүзінде өлімнің екінші себебі және мүгедектіктің үшінші себебі болып табылады. Бұл әдебиет шолуында ишемиялық инсульттің алдын алудың қауіп факторлары мен диагностикалық аспектілері сипатталған. Ұйқы артериаясының стенозы және окклюзиясы ишемиялық инсульттің емделуге болатын себебі болып табылады, оны брахиоцефалиялық артерияларды дуплексті сканерлеу арқылы анықтауға болады. Ишемиялық инсульттің алдын алу шараларының төмен тиімділігінің себептері клиникалық болжамға әсер ететін қауіп факторлары бойынша анамнездің толық жиналмауы, жалпы тәжірибелік дәрігерлердің заманауи диагностикалық әдістерді аз қолдануы болып табылады.

Современные аспекты организации профилактики ишемического инсульта у больных с экстракраниальными стенозами сонных артерий

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Аннотация

Инсульт является второй ведущей причиной смерти и третьей ведущей причиной инвалидности в глобальном

масштабе. В данном литературном обзоре были описаны факторы риска и диагностические аспекты профилактики ишемического инсульта. Стеноз и окклюзия сонных артерии являются излечимой причиной ишемического инсульта, который может быть диагностирован с помощью дуплексного сканирования брахиоцефальных артерий. Причинами малой эффективности профилактических мер ишемического инсульта, являются не полный сбор анамнеза по факторам риска, которые влияют на клинический прогноз, низкое использование современных методов диагностики врачами общей практики ПМСП в скрининговом обследовании пациентов.

Ключевые слова:
стеноз сонной артерии, экстракраниальный стеноз, ишемический инсульт, острые нарушения мозгового кровообращения, диагностика

Introduction

Ischemic stroke is an acute cerebrovascular disorder and is leading cause of long-term disability in developed countries. Mortality from stroke ranges from 25 to 30%, and survivors remain at high risk of developing recurrent ischemic episode such as heart attack, recurrent stroke, and death [1]. Atherosclerosis is the cause of about a third of all strokes, especially the bifurcation of the common carotid artery, is the main cause of ischemic stroke, accounting for approximately 20% of all strokes; while 80% of these events may occur without prior symptoms, emphasizing the need of preventive examination in patients at risk [2]. The rate of progression of carotid stenosis is unpredictable. The disease can develop rapidly, slowly or remain stable for many years. Modern treatments aim to slow down the progression of the disease and protect the patient from the development of a stroke [3].

According to the World Health Organization (WHO), from 1990 to 2019 there were 101 million cases of stroke - this figure is called the "prevalence" of the disease in the study. At the same time, in 2019 alone, 12.2 million cases of the disease were registered, 6.55 million people died. Every year the morbidity and mortality from cardiovascular diseases is increasing rapidly [1].

There are more than 2 million people who are suffering from cardiovascular diseases (CVD) in Kazakhstan. Every year, 40,000 Kazakhstanis have a stroke. Of these, 5 thousand die within 10 days after a stroke [4].

The high human and high economic costs highlight the need to reduce the burden of cardio-vascular diseases in Kazakhstan. WHO notes that the risk of developing cardiovascular diseases can be reduced by changing four behavioral risk factors (tobacco use, harmful use of alcohol, unhealthy diet and lack of physical activity), as well as metabolic risk factors such as high blood pressure or high cholesterol (WHO, 2013) [5].

Measures aimed at preventing CVD in Kazakhstan are relatively low-cost and economically beneficial. Intervention cost analyzes were conducted for four prevention packages which are targeting tobacco control, the harmful use of alcohol, lack of physical activity and excess salt intake, as well as for a package of clinical interventions, for the treatment of cardiovascular disease and diabetes. Implementation costs policy packages to reduce tobacco, alcohol, salt, and increase physical activity for the period 2018-2022 are estimated at 5.0 billion tenge, 10.2 billion tenge, 4.5 billion tenge and 4.7 billion tenge, respectively. The cost of clinical interventions, aimed at the treatment of cardiovascular diseases and diabetes, were the highest, they will amount to 140.7 billion tenge [6].

Smoking is a major CVD risk factor. This is because it causes endothelial injury and dysfunction in both coronary and peripheral arteries and an increased risk of thrombosis [7]. According to the WHO Report on the Global Tobacco Epidemic, about one-fifth (22%) of the adult population in Kazakhstan currently use tobacco, and almost everyone daily (WHO, 2017d) [7].

Alcohol-related mortality in Kazakhstan is one of the highest in the European Region. In 2016, almost 74% of male deaths from cirrhosis of the liver and 34% of injuries were attributable to alcohol use for women, these indicators were 45% and 31%, respectively [8].

Physical activity levels are not monitored in Kazakhstan on an ongoing basis. IN 2010, 21% of adults did not recommendations regarding the level of physical activity; estimated by 2016 this year. More recent estimates show that the prevalence of under-reporting physical activity in 2016 was 26% (95% CI 19-34%) for men and 29% (95% CI 20-39%) for women [9].

According to the latest ranking of 187 countries, in 2010 the standardized by age, the average daily salt intake of the population in aged 20 years and older was 15 g per day in Kazakhstan (6.0 g sodium per day) [10]. In 2010, in the 20-69 age group, 32% of cardiovascular deaths were attributable to consumption of more 5 g salt per day (more than 2 g sodium per day) [11].

Elevated levels of any metabolic factor may increase the risk of cardiovascular events; the risk is exacerbated in people with multiple risk factors. In Kazakhstan in 2016, the age-standardized prevalence of overweight (BMI ≥25 kg/m2) was 54% for men and 53% for women. In addition, 19% of men and 23% of women are obese (BMI ≥30 kg/m2) [12].

According to the World Health Organization (WHO 2020), Clinical interventions for cardiovascular disease and diabetes were the most expensive, costing 140.7 billion tenge over a five-year period [13].

Recognizing the significant impact of cardiovascular disease on the health of the population and the economy of Kazakhstan, this review suggests that there is potential for further implementation of prevention measures both at the level of the entire population and at the individual level.

The reasons for the low efficiency of the existing system of stroke prevention are associated with ideological, organizational and technological problems. Among them, the most significant are: the inconsistency of the concept of risk factors for assessing an individual prognosis, the lack of organizational solutions that allow qualified screening of the population to detect cerebrovascular pathology, the insufficient use of new diagnostic methods by general practitioners in screening patients, as well as the rigidity of thinking of some doctors, considering invasive surgery as a cause of disability. The identification of patients with carotid stenosis has crucial role in the prevention of ischemic stroke. Safe and informative methods of ultrasound diagnostics characterized the brain vessels conditions, it also timely detected danger o us atherosclerotic plaques, critical narrowing of the arteries which can lead to ischemic stroke.

Extracranial carotid artery diseases state

Carotid disease studies have historically classified patients into two groups: symptomatic (patients who have had a stroke, t r ansient ischemic attack (TIA), or fugax amaurosis due to cerebral ischemia) and asymptomatic (no neurological events but only clinical signs of atherosclerosis).

With asymptomatic carotid stenosis, the risk of stroke

in the next year increases by more than 3% (the relative risk increases by more than 50%) [14]. According to most studies, the risk of ipsilateral stroke increases with increasing degree of stenosis: less than 1% per year with stenosis; less than 50% - from 1% to 5% per year with stenosis of more than 50% [15, 16].

In symptomatic patients, there is a clear correlation between the degree of stenosis and the risk of stroke. According to NASCET (North American Symptomatic Carotid Endarterectomy Trial), the incidence of stroke after 18 months of medical therapy without revascularization was 19% in patients with 70–79% stenosis, 28% in patients with 80–89% stenosis, and 33% in patients with 70–70% stenosis, 79% patients with 90–99% stenosis [17]. This correlation is less clear in asymptomatic patients. In the ACAS and ACST study, asymptomatic patients with 60–80% stenosis had a higher incidence of stroke than patients [18]. The annual incidence of stroke in asymptomatic individuals with carotid stenosis of more than 60% receiving drug treatment is 2.5% [19].

Two mechanisms contribute to the high risk of stroke in carotid stenosis: hypoperfusion and arterial embolism. The main difference between symptomatic and asymptomatic stenosis, perioperative risk and patient life expectancy is determined by therapy [20]. Stroke associated with atherosclerotic lesions of the extracranial carotid arteries can occur through several mechanisms [22]: atheroembolism of cholesterol crystals; arterial embolism; structural disintegration of the wall (dissection); acute thrombotic occlusion; decreased cerebral perfusion with plaque growth.

Worldwide, cerebrovascular disease accounts for more than five million deaths per year (1 in 10) and approximately 3% of total health care spending. In 2003, about 21 billion euros were spent in the European Union on the treatment of cerebral ischemia. From 2005 to 2050, the estimated cost of a stroke to the US economy is $2.2 trillion. In the face of a global health problem, with significant associated costs, advances in stroke prevention and its consequences are needed [22].

Screening for asymptomatic carotid stenosis:

A. Screening ofsymptomatic patients;

B. Potential "high risk groups" who may benefit from screening for asymptomatic stenosis.

To choose the imaging techniques to evaluate carotid arteries: duplex ultrasound examination of the carotid arteries; magnetic resonance imaging and angiography; computed tomography angiography; catheter digital subtraction arteriography [23].

Carotid ultrasound is widely available and is associated with little risk and discomfort. Medical and economic studies have not shown the feasibility of mass screening of the adult population using ultrasound duplex scanning. However, there is evidence of the advisability of screening in risk groups for prophylactic surgical treatment in order to reduce the incidence of strokes, total population screening for asymptomatic carotid stenosis not recommended due to lack of cost-effectiveness, as well as the potentially harmful effects of false positive and false negative results in the general population, and the small absolute benefit of various types of invasive interventions [24]. They recommend to screening the adults over 65 who have three or more risk factors for cardiovascular disease, and screen asymptomatic patients with carotid murmur who are potential candidates for carotid revascularization and screen those who are scheduled for coronary bypass surgery. However, many authors suggest that screening for CS among high-risk individuals will allow timely drug therapy to prevent stroke and cardiovascular events [25].

Management of patients with extracranial stenosis of the carotid arteries at the level of primary health care and hospital

Management of patients with atherosclerotic carotid stenosis should include both consistent modification of risk factors, including lifestyle changes (smoking cessation, healthy, balanced nutrition, exercise), and, in the presence of arterial hypertension and / or diabetes mellitus, treatment in accordance with the principles. The recommended medication is 100 mg aspirin daily for asymptomatic stenosis and 100 mg aspirin or 75 mg clopidogrel for symptomatic stenosis. Statins should be taken for long-term prevention of cardiovascular disease. Current guidelines recommend lowering LDL cholesterol to < 70 mg% or < 50 mg% in patients at high risk for atherosclerosis [26]. Currently, the aim of medical treatment of symptomatic extracranial stenosis of the internal carotid artery is to reduce the likelihood of further embolic events originating from the plaque of the internal carotid artery. Medical management aims to prevent further events until carotid disease is healed and, secondly, to manage the risk factors that are common to cardiac atherosclerotic disease, thus reducing the risk of future ischemic events. A 2016 meta-analysis showed that early initiation of acetylsalicylic acid monotherapy after TIA or ischemic stroke reduced the rate of subsequent events by 60% [27].

"Surgery" includes carotid endarterectomy and carotid stenting. Decades ago, intervention for secondary prevention after extracranial embolic stroke from the internal carotid artery was delayed by 4–8 weeks to allow the brain to "recover". This was done in the hope of avoiding the consequences of early reperfusion such as cerebral edema and hemorrhage. However, excessive delay in intervention resulted in an excessively high number of recurrent strokes [28]. Large-scale randomized prospective multicenter studies in America and Europe (NASCET, ECST, ACAS) have proven the advantages and high efficiency of surgical treatment of patients with symptomatic and asymptomatic disease with severe ICA stenosis compared with conservative therapy. The results of these studies have made carotid endarterectomy the procedure of choice, subject to standards developed by the Stroke Council and American Heart Association in 1989 [29]. New Canadian guidelines recommend intervention on the carotid arteries during the first few days after a non-disabling stroke or TIA. Dual antiplatelet therapy is warranted immediately but should be limited to a short period (less than 21 days) due to the risk of bleeding. Statin therapy should be considered as secondary prevention; however, its benefit in reducing early relapses is not clear [30].

Conclusion

Screening for carotid stenosis being costly for routine carotid ultrasound in the population remains controversial. At the same time, it must be recognized that ultrasound is important not only for everyday clinical conditions, but also for the introduction of patients with acute ischemic stroke. Visual assessment and dynamic changes using carotid ultrasound can provide valuable information for primary health care. This strengthens the interaction between the hospital and primary health care.

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