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Principles of Treatment of Ischemic Stroke

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Abstract: Ischemic stroke (IS) is a polyetiological and pathogenetically heterogeneous clinical syndrome. In each case, the AI should try to establish the immediate cause of the stroke, since therapeutic tactics will largely depend on this. Of particular importance is the timeliness, continuity and correct treatment tactics at all stages of treatment for ischemic stroke. Great importance is given to restorative and rehabilitation measures, which are aimed at reducing disability and the most complete restoration of lost neuronal functions.

Keywords: ischemic stroke, cerebral infarction, reperfusion, neuroprotection, antiplatelets, anticoagulants, angioprotectors, antioxidants.

According to WHO criteria, ischemic stroke is defined as “an acute focal neurological disorder with clinical manifestations persisting for more than 24 hours, the probable cause of which is cerebral ischemia.” Cerebral infarction is characterized by the rapid development of neurological disorders, manifested by general cerebral and focal disorders. It is necessary not only to establish the ischemic nature of the stroke and its localization, but also to determine its etiopathogenetic variant. To do this, it is necessary to assess the presence of risk factors for cerebrovascular accident, such as arterial hypertension (HTN), heart and vascular diseases, diabetes mellitus, patient age (over 50 years), smoking, as well as a previous ischemic stroke or transient ischemic attack.

According to the World Federation of Neurological Societies, at least 15 million strokes are recorded annually in the world. Moreover, it is assumed that these data are clearly underestimated, since in developing countries many cases of stroke are not registered or are completely ignored by doctors due to the inaccessibility of medical care. In Russia, the incidence of stroke is 3.4 per 1000 people per year. In absolute numbers, this amounts to more than 450,000 new strokes per year.

In most countries of the world, acute cerebrovascular accidents are among the four most common causes of death. At least a third of strokes lead to death in the acute period. Over the next year, mortality increases by another 10-15%. Stroke is one of the most common causes of disability. 80% of stroke survivors develop some degree of limitation in activities of daily living.

With the development of ischemic stroke, treatment consists of several stages: • pre-hospital; • hospital (basic, differentiated); • rehabilitation (physical therapy, reflexology and massage).

Treatment tactics at the prehospital stage.

The formation of a stable focus of necrosis and the development of structural and morphological changes in the neurons of the brain when a cerebral infarction occurs occurs within 3-6 hours after the onset of the first symptoms, the so-called “therapeutic window”. During this time, when blood supply to the ischemic area is restored, the process of formation of a necrosis focus is stopped and neurological deficit is minimized. The emergency physician provides the patient with intensive (resuscitation if necessary) medical care aimed at eliminating life-threatening disorders of the cardiovascular and respiratory systems (using special nasal and oral air ducts), and suctioning out secretions from the mouth and nose (mucus and/or vomit). If necessary, tracheal intubation, artificial respiration, and chest compressions are performed.

General (basic) treatment of ischemic stroke.

Basic therapy is aimed at maintaining the vital functions of the body. It includes the following activities: assessment and correction of disorders of the respiratory and cardiovascular systems; control

of water and electrolyte balance; treatment of increased intracranial pressure and seizures; correction of blood pressure; normalization of glucose levels (insulin therapy for hyperglycemia >10 mmol/l); normalization of body temperature (artificial cooling, diclofenac, naproxen, acetaminophen at t>37.5°C); maintaining normovolemia (avoid using glucose-containing solutions); prevention and timely diagnosis of infectious and thromboembolic complications; early start of adequate nutrition (natural or artificial enteral); the earliest possible verticalization (days 2–4); comprehensive rehabilitation by a multidisciplinary team.

Reperfusion and neuroprotection in ischemic stroke.

In the pathogenesis of the development of acute focal cerebral ischemia, the main significance belongs to the decrease in cerebral blood flow and the development of circulatory hypoxia due to insufficient supply of oxygen and glucose to the nervous tissue. The most promising methods for preventing irreversible damage to the brain in patients with ischemic stroke are restoration of local cerebral blood flow (thrombolytic therapy) and metabolic protection of the brain (neuroprotection).

For the purpose of reperfusion of an ischemic lesion, the following is used:

1. Platelet and erythrocyte antiplatelet agents: acetylsalicylic acid, dipyridamole, ticlopidine, clopidogrel, pentoxifylline.
2. Anticoagulants: heparin, low molecular weight heparins, phenylin, warfarin.
3. Vasoactive drugs: vinpocetine, nicergoline, instenon, (aminophylline), cinnarizine.
4. Angioprotectors: parmidin (prodectin), troxerutin, etamsylate.
5. Biorheological preparations: plasma, albumin, rheopolygluci, aminophylline.

Neuroprotection in patients with cerebral infarction is carried out using drugs such as:

1. Calcium channel blockers: nimodipine.
2. Antioxidants: emoxypine, mexidol, mildronate, alpha-tocopherol acetate, ascorbic acid.
3. Drugs with predominantly neurotrophic action: piracetam, Cerebrolysin, Cerebromedin, Semax; glycine, carnitine chloride, aminalon, picamilon.
4. Drugs that improve tissue energy metabolism: cytochrome C (cytomac), actovegin, solcoseryl, diavitol gliatilin, riboxin, lipoic acid.

Basic antihypertensive therapy.

In the first 7-10 days after the manifestation of IS symptoms, you should refrain from aggressive antihypertensive therapy. It has been shown that the increase in blood pressure in the first hours and days of a stroke is of a reflex nature and plays a certain sanogenetic role. A decrease in blood pressure in these cases can lead to an increase in the severity of neurological symptoms. After 7-10 days, treatment of arterial hypertension is carried out in accordance with the general principles of treatment of this disease. It has been shown that gradual normalization of blood pressure significantly reduces the risk of recurrent cerebrovascular accidents.

Cerebral edema is a serious complication of IS and can lead to increased intracranial pressure and, as a consequence, to dislocation and compression of cerebral structures. Therefore, if signs of cerebral edema appear, decongestant therapy should be started immediately. The drug of choice is mannitol; dexamethasone is less effective. To reduce cerebral edema, controlled hyperventilation is also performed.

Differentiated therapy in the acute period of IS

Epidemiological studies indicate that at least 70% of IS are associated with thrombosis or thromboembolism of the cerebral arteries. In these cases, the most modern treatment method is thrombolysis - the dissolution of blood clots in the cerebral arteries. Indicated only in the first hours

after a primary, sudden, moderate or severe ischemic stroke. The following thrombolytics are used: pharmacokinase, alteplase, Arixtra. They continue to use anticoagulants, disaggregants, agents that improve the rheological properties of blood and microcirculation, nootropics, true cerebroprotectors, antioxidants and restorative drugs. Prevention of bedsores and congestive pneumonia is carried out in patients with complex stroke.

Rehabilitation and restorative treatment.

Rehabilitation begins immediately after stabilization of the general condition and includes physical therapy, massage, gymnastics, physiotherapeutic procedures, and sanatorium and resort treatment.

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