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Stroke: costly public health problem

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Abstract

An apoplectic stroke is one of the main causes of diseases and mortalities in the world. Mainly, it concerns elderly people, more often men than women. Worldwide it is the second biggest killer, third in developed countries, as a result of the cardiovascular system's diseases. The research presents the general characteristics of brain stroke, characterized risk factors and complications of brain stroke, and principles of brain stroke treatment. The most common form of strokes are called ischemic stroke, brain infarction, around 85% of all strokes. The greater and the most important an apoplectic stroke's factor is high blood pressure. It makes it four times more possible to be struck by an apoplectic stroke. An apoplectic stroke is an urgent state requiring conservative treatment and at times even surgical one. According to the European Stroke Initiative, proper patient care suffering from a quite recent stroke regarded as an urgent state depends on a 4-element chain: fast diagnosis and response to symptoms of a stroke, urgent informing emergency medicine service, urgent transport to a hospital (earlier information about its arrival), fast and proper diagnosis and hospital treatment.

Keywords: Stroke, Cost, Prevention, Quality of care, Public health

Introduction

An apoplectic stroke is one of the main causes of diseases and mortalities in the world. Mainly, it concerns elderly people, more often men than women. Worldwide it is the second biggest killer third in developed countries, as a result of the cardiovascular system's diseases. Ruthless frequency of deaths, as a consequence of an apoplectic stroke, equals in Europe from 63.5 to 273. per 100,000 citizens. So big are differences in the mortalities between countries of Western and Eastern Europe appears because of the differences in existing risk factors-higher blood pressure and other dangerous problems (for example coronary heart disease, diabetes, higher alcohol consumption) in Eastern European countries comparing to western nations[1-3]. Additionally, it also causes an apoplectic stroke to run more heavily in cases of sick people of Eastern European. However, even in cases of Western European citizens were noticed regional differences in terms of stroke. MONICA study[4] covering 16 European populations and the two Asian countries proved through a ten years period of significant distinction in falling sick and three times bigger difference in 28-day mortality (women 18-57%, man 15-49%), as well as confirmed the reliability of official statistics in most countries. The higher rate of seek people and deaths caused by an apoplectic stroke in Europe (among insured citizens) was exposed in Finland and Eastern European counties, however, Warsaw statistics showed high mortality rate and relatively low sick people [5].

Every year in Poland 60,000 people have an apoplectic stroke, furthermore, during the first month of straggling with the disease 40% of patients die, what annually come to 32,000 demises [6] Every year in Europe the condition develops in approximately one million people and it causes 700,000 deaths. Global incidence rate of stroke equals 1.22 per 1,000 people. After few weeks from when the condition is recognized, only 10% of patients fully recover.

Early rehabilitation allows an average of 90% of patients to come back to a semi-normal life [7].

Characteristics of an apoplectic strokes

An apoplectic stroke is a brain dysfunction, caused by sudden arrest of blood to the brain (due to a blockage or rupture of an artery supplying blood to the brain) as well as neurological symptoms resulting from deficiency of the blood supply. According to WHO stroke is "focal or global disturbance of brain function vascular etiology occurring suddenly and lasting longer than 24 hours".

Classification of apoplectic strokes: Ischemic stroke: Thrombosis; Embolism; .Systemic; hypoperfusion; Venous thrombosis. Hemorrhagic intracerebral hemorrhage subarachnoid haemorrhage. The most common form of strokes are called ischemic stroke, brain infarction. Around 85% of strokes are caused by ischemia and the average of 15% by hemorrhage[8]. The most frequent apoplectic stroke is caused by the interruption of the blood supply to the brain, usually because a blood vessel bursts or is blocked by a clot. This can be caused by a disease of the vessel wall, embolism of cardiac origin, haematological disorders and other rare disorders which can be important in young age. In an ischemic stroke, blood supply to part of the brain is decreased, leading to dysfunction of the brain tissue in that area. Mainly atherosclerotic and thrombotic changes of brain arteries are responsible for that stroke (50% of strokes). Atherosclerosis of endocranial and extracranial arteries causes thrombotic and embolic complications. Another reason may be small vessel disease (25% strokes), which results in a lacunar stroke or lacunar infarct. Approximately 1% of all strokes are caused by venous thrombosis and sinuses of the brain. In conclusion, average of 90% of all ischemic strokes is caused by atherosclerotic and thrombotic changes in large arteries, pathology of small terminal arterioles and embolism of cardiac origin [9].

"The location of outbreaks of infarction determines the neurological symptomatology of ischemic strokes. The knowledge of the symptomology, can approximate the area of the cerebral artery where an apoplectic stroke occurred" [9].

Area of the internal carotid artery vascularity. The complete closure of the internal carotid artery may have no symptoms, but it can also mean an infarction almost the entire hemisphere of the brain and sudden death. Strokes in areas of carotid artery caused: paresis or hemiplegia which can be accompanied by aphasia, sensory and eyesight disorder. Area of the middle cerebral artery vascularity. The occlusion of this artery is caused by embolism. Symptoms can

be similar to the internal carotid artery blockage. It is observed in the case of viable collateral circulation. Very often, the embolism moves on the circuit of cortical branches and causes minor neurological deficit, for example facial asymmetry or paresis of the hand.Area of the anterior cerebral artery's vascularity. The occlusion of this artery is caused also in most cases by embolism. A characteristic symptom is contralateral paresis, mainly a lower limb with related sphincters disorders (mostly incontinence).Area of the vertebral artery, basal artery and posterior cerebral artery's vascularity. The occlusion of these areas most likely cause: dizziness, nystagmus, double vision, blurred vision and imbalance. Smaller outbreaks of the ischemia in the brainstem cause so-called alternating symptoms. The most serious clinical symptoms are correlated with a posterior cerebral artery's clot. In the case of complete blockage comes to tetraplegic and coma, narrow pupils and respiratory, and circulatory disorders often lead to death. In most cases, the occlusion of a basal artery is caused by embolism. The most common symptom is alternating hemianopsia or quadrantic. If the dominant hemisphere suffered ischemia, the symptoms are accompanied by dyslexia and dyscalculia. Cortical blindness (inability to recognise objects) is a result of myocardial infarction of both posterior cerebral arteries. An apoplectic stroke causes global and focal brain dysfunction. To global brain dysfunction are assigned: Disorder in muscular tonicity - smaller tonicity (limpness) and increased tendon reflexes (spasticity). Limpness impairs posture control, weakens the affected limb, breathing problems, expectoration of mucus, and interferes with sphincters' control. On the other hand, spasticity interferes with speech, eating and ingestion. It impairs free movement. They prevent the movement; interfere with daily routine steps as dressing up, washing. They are painful for the patient and aggravate a disability [10]. Autonomic dysfunction- abnormal pressure, pulse, respiration, temperature, etc.Excessive reflexes- dysfunction of the nervous system after an apoplectic stroke triggers activities of pathological reflexes. If they are not suppressed they can be fixed and once remembered they are triggered by any, even unconscious, effort. To focal brain dysfunction are included: Motor and coordination dysfunction: Paralysis (latin hemiplegia) or hemiparesis- This is the loss of mobility on one side of the body, opposite to the brain damage (damage of left brain hemisphere results in paralysis of the right side of body and inversely). When there is complete loss of function in the limbs it is paralysis. However, if function are partially retain, it is hemiparesis. Cerebellar symptoms- impaired coordination, balance and posture. Dysphagia and speech disorders (dyzartria)- caused by the weakening of facial muscles, what leads to difficulties with drinking, eating and pronunciation. Information and cognitive disorders. These types of difficulties are able to make patience more dysfunctional

than physical disturbances. Aphasia- speech disorder resulting from damage to speech centres, often in the dominant hemisphere of the brain: motor aphasia- dominated by disturbances in speaking and expressing opinions; sensory aphasia- it exhibits itself as inability to comprehend the meaning of speech; patient has difficulties with understanding spoken content; mix aphasia- disturbances as well in speaking as in comprehending; amnestic aphasia (anomia)- it exhibits itself as inability to name words, objects, streets etc; Total aphasia- connecting all forms of aphasia, lack of any communication with patients Agnosia- inability to recognize well- known objects by use of the senses, however, fully efficiency of senses: hearing, sight, touch, smell. Visual agnosia- involves the inability to recognize objects with the intact organ of sight; they can be identifying using other senses. tactile agnosia- enables the organism to recognize or identify objects by touch alone; auditory agnosia- there is difficulty distinguishing sounds even though hearing is usually normal; autotopagnosia - "lack of awareness of the topography of own body, an inability to localize and orient different parts of the body" Anozognosia - the inability to gain feedback about one's own condition; overlooked or even deny that it has faulty leg; he is convinced about his good health. It is dangerous situations because the patient can try to get up and injure himself Attention disorders- "the presence of deficits in attention seems to be a bigger problem that just sustaining damages, aphasia whether problems in the sphere of intellectual" Arousal - arouses state which causes difficulties with perceiving surroundings; it may lead to not noticing obstacles. Unilateral not noticing- patient is not able to see what is going on paralysed side; it can be connected with sight, hearing or motor difficulties - then despite the strength and felling, he is not able to make a move. Atrophy - when two stimuli are introduced on both side of the body, patient can feel just the one on health side [11,12]

Risk factors of an apoplectic stroke

Risk factors of an apoplectic stroke can be divided on non-modifiable and modifiable. The group of non-modifiable factors, which cannot be controlled include age, sex, hereditary burden and a history of prior TIA (Temporary Ischaemic Attacks) or an apoplectic stroke. The greatest risk of an apoplectic stroke is connected with elderly people (the risk doubles every 10 years). Man are the group of higher risks. Occurrence of an apoplectic stroke is associated with a history of prior TIA or an apoplectic stroke in the family. Modifiable factors are the one which can and should be eliminated. These include: high blood pressure, heart diseases, diabetes, smoking, alcoholism, obesity, lipid disorders, low physical activity, improper diet.

The greater and the most important an apoplectic stroke's factor is high blood pressure. It makes it four times more possible to be struck by an apoplectic stroke. Therefore, existing more than one risk factor increases the possibility even more [12]

Complications of an apoplectic stroke

Death of patients with ischemic stroke is often caused by various cerebral and "external brains" complication. The most common early cerebral complications are: brain edema and hemorrhagic transformation of infarct area**.** Complications such as seizures, emotional disorder may reveal itself in early, but also in late stage of stroke. However, more often appear "external brains" complication, such as: cardiac or/and thromboembolic complications and infections. Brain edema in patients with stroke is a natural reaction, resulting from focal cerebral ischemia. There are cases where developing very rapidly, causes a large increase in intracranial pressure. In addition, it leads to intussusception, and secondary impairment of cerebral blood flow. Therefore, it is necessary to monitor patients for signs of intracranial hypertension from the early days of stroke. At times, additional tomography should be done and quickly turn anti- edematous treatment. Hemorrhagic transformation of infarct area appears during the first week of disease. Is a contraindication to the inclusion of anticoagulation. Epileptic seizures usually occur later as a single focal or generalized attack. However, they can turn into a more serious series of seizures or case of epileptic state. As soon as possible drug therapy should be implemented; this should be continued through the next six months, if seizures will not appear again. Additionally, depression is an overlook, however, frequent a complication in strokes. It can disclose itself in first week of the disease. It causes the lack of willingness to take any action, therefore reluctance towards rehabilitation. In this case, the best solutions are psychotherapy and medication. Cardiac disorders are very often causes of deaths among patients with strokes. These include heart failure, myocardial infarction, cardiac arrhythmias. Patients, especially during the first days of a stroke, should remain under constant cardiological care which will enable their early detection and rapid adoption of appropriate treatment. Hypertension is characteristic for 80% of patients admitted to hospital in acute phase of a stroke. It can be caused by existing overpressure or stress caused by the fact by being hit by a stroke. Treatment should be accurate because of the sudden drop in blood pressure may adversely affect cerebral perfusion pressure, which influences local cerebral blood flow. However, in most cases the high blood pressure reduces itself in the first hours and days after a stroke. In the same time, we should keep awareness of

possible hemorrhagic transformation ischemic stroke. As well as depression and hypertension, respiratory infections may appear in the first days after stroke. They can be caused by existence of large amount of excretion in the airways, choking, (the main cause of bacterial pneumonia), and also lower thorax movement on the paralyzed side. In these circumstances, it is important that principles of the prevention will be set in motion e.g., early rehabilitation, breathing exercises, regular suctioning of residual secretions from air passages.

Urinary tract infections occur more frequently than respiratory infections, both acute and chronic phase of stroke. To avoid these unpleasant symptoms patients should be given adequate amount of liquids and avoid a permanent catheter if it is possible. If the infection will occur, it is necessary to introduce appropriate drug therapy.

Unilateral neglect syndrome is a complicated cognitive impairment and it is connected with limited capacity to react, respond, and turn toward new or significant stimuli coming from one side of body or around- or extrapersonal space, opposite to the brain damage localisation.

Mostly, it is caused by ischemic stroke and cancer lesions in the brain, in most cases in the right hemisphere (left-sided neglect). The right- sided neglect, caused by damage of the left brain hemisphere and it is less strong. A symptom reveals itself in different sensory modalities: visual, auditory, sensory and motor (motor neglect). Left-sided symptoms are usually more intense, various and more durable than the right- sided. There were distinguished two types of neglect syndrome: perceptive (it manifests itself in difficulties with receiving stimuli) and motor (it causes difficulties the physical examination of space and a functional use of neglected limb). Additionally, the clinical practice proves that unilateral neglect most commonly occur in acute phase after brain injury.

Heterogeneous syndrome with several subtypes arises in the first days after a stroke (visual, auditory, tactile, olfactory and motor neglects). After a weeks' time, patients get better, although, it is still present the skipping e.g. left- side resulting in lesser use of a left limb during daily routine, eating just out of the left side of the plate, reading just the right edge of text, not responding to the questions asked from the left side. Later on, neglect symptoms in some patients' cases can decrease or even withdraw spontaneously due to a functional cortical reorganization. A few months after the onset of a stroke, unexpected recovery still can occur; however, it does not lead to complete recuperation [13,14]

Treatment

An apoplectic stroke is an urgent stake which requires conservative treatment, sometimes also surgical intervention. European Stroke Initiative stated that the carei n the emergency state depends on four elements' chain: quick recognition and reaction on symptoms of a stroke heralds; immediate notification of emergency medical services; prioritised transport with notifying the hospital, which a patient is transported to; rapid and correct diagnosis and treatment in hospital [15]

Any person with suspected an apoplectic stroke should diagnosed immediately after being brought to the hospital and a positive diagnosis is an indication for hospitalization in a specially designed unit, or subdivision. The identification of a stroke generally does not pose major difficulties. After all, a simple neurological examination can help to establish an impending stroke. Symptoms are subtle; these include impaired reflexes, loss of balance or coordination, tremors and weakness of hands. This examination could have helped to predict the stroke in healthy elderly people. With more than three types of symptoms involving hand disability, it is crucial to surround a patient with special care. Nevertheless, for proper treatment it is necessary to determine a clinical stroke and to verify its cause. The first step is to determine whether there was ischemic or hemorrhagic stroke. To this end, the most important diagnostic test is computed tomography (CT). It helps to exclude hemorrhagic stroke, to assess the location and size of outbreaks infarcts. After the diagnosis of stroke, should be found the central point of ischemia area - in the anterior circulation or in the posterior circulation, then the causes - thrombosis, embolism, systemic hypoperfusion, venous thrombosis. Regardless, CT scan is able to miss ischemia, if it is performed in an early stage of disease. Another device used for stroke patients is Magnetic resonance imaging (MRI). It detects the area of abnormality caused by ischemia placed in subcortical in white matter (systemic hypoperfusion), the MRI images of brainstem and cerebellums are much more detailed. Other types of MRI scan are magnetic resonance angiography (MRA). It is used to detect stenosis (blockage) of the blood arteries invasively. Therefore, its use in ischemia's discovery is limited. However, the most popular examination technique is ultrasound. The duplex Doppler method diagnoses carotid arteries in a complex way. It is a non-invasive screen for narrowing and decreased blood flow in main arteries and visuals the carotid arteries: including stenosis, thrombus, atheroma, dissection, occlusion, etc. Transcranial Doppler ultrasonography (TCD) presents the blood flow in the main intracranial arteries. It is especially used in detecting stenosis in the major cerebral artery. They are different methods

of diagnosis which are commissioned in individual cases. They include: transesophageal echocardiogram (in the case of a suspected blood clot in the left atrium), echocardiogram of heart (suspected aetiology of cardio-embolic stroke), arteriography (to confirm the diagnosis of carotid artery dissection, vasculitis), 24 h Holter examination (when suspected arrhythmias). All patients with stroke vital function, at least during the first day, should be monitored (blood pressure, temperature, EKG, blood oxygenation). In the treatment of ischemic stroke are applied medicines improving cerebral circulation and neuroprotective drugs. Most of all should be in use only medications with proven effectiveness, as well as surgical and pharmacological treatments should never be a routine. Each time, an individual approach should be implemented in choosing the right treatment (antithrombotics, thrombolytics or neuroprotectants) [16]. Strokes are one of the basic causes of adults' disabilities luckily; therapies are available to help rehabilitate post-stroke patients. They should be introduced from the first days after admission to hospital. Rehabilitations mainly aim in maximizing the patient's mobility, improving its communications with the environment and the ability to live independently. Moreover, early one should prevent complications resulting from the patient's immobilization. It should be also ensured a constant psychiatric care to convalescents, what prevents developing sense of despondency and resignation, influencing treatments. Except doctors and nurses looking after patients, in these tasks should be involved multidisciplinary rehabilitation team including physiotherapist, speech therapist, clinical psychologist and therapist Additionally, rehabilitation program should be planned individually for every patient. Therefore, it is necessary to conduct interview involving matters of general fitness and lifestyle before a stroke, his/her expectations and possible family, friends help. It is also crucial to assess the general health condition (cardio-respiratory endurance, severity of damage to internal organs), as well as the level of physical and psychological disabilities with appropriate scales and tests. [17-19]

The aim of rehabilitation after a stroke is to change the patients' opinion about their health. After the stroke, patients are focused on what they lost. Treatments meant to change that perspective and direct therapeutic measures towards restoring lost functions.

Conclusions

An apoplectic stroke is one of the main causes of diseases and mortalities in the world. Therefore, it appears as important health issue of contemporary world. It has be considered as a state of urgency, because time is crucial (<3 h from the first symptoms). Actions taken in a

acute ischemic stroke must consider urgent, necessary diagnostics (especially computed tomography) and early attempt of reperfusion that can be achieved by intravenous dose of recombinant tissue plasminogen activator– rtPA. It is crucial to start early the secondary prevention using various treatments, depending on etymology ischemic stroke (thrombotic or embolic). Rehabilitation should be implemented as soon as possible and continues for at least few weeks. It should be led by train team of specialists. There should be a continuous education of the public to teach how to recognize an apoplectic stroke's symptoms, as well as awareness of the necessity of immediate medical attention, making the emergency call and immediately transport the patient to a suitably equipped hospital with a specialized branch of the treatment of stroke [21]

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