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## **A patient with ischemic stroke and myocardial infarction undergoing interventional treatment - a case report**

### **Pacjent z udarem niedokrwiennym mózgu i zawałem mięśnia sercowego poddany leczeniu interwencyjnemu- opis przypadku**

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**Słowa kluczowe:** udar niedokrwienny mózgu. zawał mięśnia sercowego, leczenie interwencyjne

**Key words:** ischemic stroke. myocardial infarction, interventional treatment

## **Streszczenie**

Współwystępowanie ostrego udaru niedokrwiennego i ostrego zawału mięśnia sercowego jest rzadkie. Terapia reperfuzyjna zastosowana w odpowiednim czasie jest złotym standardem w leczeniu obu jednostek chorobowych. Przedstawiamy przypadek skutecznej trombektomii aspiracyjnej tętnicy okalającej przedniej mięśnia sercowego oraz skutecznej trombektomii mechanicznej prawej tętnicy szyjnej wewnętrznej u 49 - letniej pacjentki z zawałem mięśnia sercowego i udarem niedokrwiennym mózgu. Przy przyjęciu w badaniu neurologicznym otrzymała 16 pkt. w skali NIHSS. Pacjentka została wypisana z oddziału jako samodzielna, z niewielkim niedowładem połowicznym lewostronnym (NIHSS 4 pkt.). Uzyskano wynik rekanalizacji 3 pkt. w skali TICI. Po leczeniu inwazyjnym zalecono pacjentce stosowanie terapii przeciwkrzepliwej ze względu na zakrzepicę tętniczą w dwóch łóżyskach naczyniowych i wysokie prawdopodobieństwo trombofilii do czasu wykonania pełnej diagnostyki. W trakcie hospitalizacji przeprowadzono diagnostykę chorób sercowo-naczyniowych. ECHO przezprzelykowe uwidocznilo przepływ lewo – prawo przez foramen Botalli o szerokości ok. 3 mm, bez widocznego odwrócenia przecieku po podaniu kontrastu. Wykonane po 3 miesięcznej karencji badania nie potwierdziły trombofilii. Pacjentka jednakże wymaga dalszej stałej obserwacji. Do rozważenia w dalszym ciągu pozostaje kwestia zamknięcia przetrwałego otworu owalnego, ponowne wykonanie badań holterowskich oraz dalsza diagnostyka genetyczna.

## **Abstract**

The coexistence of acute ischemic stroke and acute myocardial infarction is rare. The reperfusion therapy used in the therapeutic window is the golden standard in the treatment of both diseases. We present a case of successful aspiration thrombectomy circumflex anterior artery and effective mechanical thrombectomy of the right internal carotid artery in a 49 - year-old female patient with myocardial infarction and ischemic stroke. When admitted in a neurological examination she received 16 points. on the NIHSS scale. The patient was discharged from the clinic as an independent, with slight hemiparesis (NIHSS 4 points). The result of recanalization was 3 points in the TICI scale. After intravascular treatment, the patient was advised to use anticoagulant therapy due to arterial thrombosis in two vascular areas and a high probability of thrombophilia until complete diagnostics. During the hospitalization, cardiovascular diseases were diagnosed. Transesophageal echocardiography showed a left-right flow through Botallio foramen width of 3 mm, with no visible reversal of

leakage after contrast administration. After 3 months, tests were performed that did not confirm thrombophilia. The question of closing the surviving Botallio foramen, re-performing Holter and further genetic testing remains to be considered.

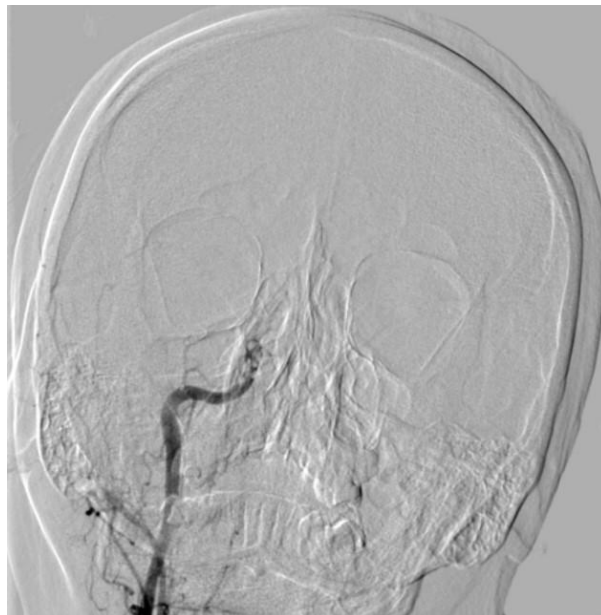
## **Introduction**

The World Health Organization defined stroke as a "neurological deficit of cerebrovascular cause that persists beyond 24 hours or is interrupted by death within 24 hours" and have no other reason than vascular. Stroke is the third most common cause of death in highly developed countries, after heart disease and cancer and the main cause of disability in adults. In Poland, the incidence of stroke is 175 per 100.000 in men and 71 per 100.000 in women. In young people, the most common (22-35%) is a stroke with a different or undetermined cause [1]. Information on the incidence of vascular diseases in women of childbearing age is limited. These diseases are rare in this age group. The incidence of myocardial infarction in women of reproductive age and who are not pregnant is 5.0 per 100.000 women / year. The incidence of non-pregnancy-related stroke is 10.7 per 100.000 women / year. Myocardial infarction is rarely up to 35 years in women [2]. The causes of stroke include: atherosclerosis of a large artery (15-40%), occlusion of a small vessel (15-30%), cardiac embolism (15-30%), unspecified causes (up to 40%), other causes (<5%) [3]. Mechanical removal of the embolus that restores perfusion within  $\leq 6$  hours from the onset of symptoms together with intravenous rtPA (recombinant tissue plasminogen activator) are a new standard in the treatment of recent ischemic stroke due to large artery occlusion in the anterior region of cerebral vascularization [4].

## **A case report**

A 49-year-old woman was admitted to the Hospital Emergency Department due to stroke symptoms and ECG changes suggestive of myocardial infarction. The patient was not treated chronically for any reason, the risk factor was smoking cigarettes in a small amount (several pieces per day). Interview in the direction of fever, use of hormonal drugs, thrombosis or miscarriage was negative. The patient's mother suffered pulmonary embolism in the postpartum period. The ECG performed on admission describes the intermediate axis of the heart, sinus rhythm 60 / min, acute infarction of the anterior and lateral walls and significant ischemia of the lower wall. Transthoracic echocardiography showed extensive contractility disorders. Computed tomography (CT) of the head without contrast showed hyperdense central right cerebral artery, brain and intracranial fluid spaces correct, without

intracranial hemorrhage. Within the head shells, in the left parietal region, a highly hypodense area and a loss of 54 mm thick coatings and a few gas bubbles in this area - condition after surgery. The day before admission, the patient was discharged from the Surgery Clinic, where she was hospitalized to remove the exophthalmous skin tumor of the parietal region of the left with the skin graft from the right thigh. During hospitalization due to menstrual bleeding, she received Cyclamin and Exacyl intravenously. After discharge, she had diarrhea. Next In the emergency department she was consulted by neurology and a cardiologist. The neurological examination was diagnosed with: i) unconsciousness in the form of somnolence; ii) dysarthria; iii) turn the head and eyeballs to the right; iv) left hemiplegia. She received 16 points on the NIHSS scale (National Institute of Health Stroke Scale). The neurologist disqualified the patient from thrombolytic treatment due to surgical intervention two days earlier, the unclear nature of the removed tumor and the size of the stroke. The cardiologist qualified the patient for immediate coronary angiography. In the angiographic examination of the coronary arteries showed a 100% closed intra-ventricular branch. Aspiration thrombectomy was performed, resulting in a large mass of thrombus, and no stent was implanted. After the cardiac procedure, for the treatment of stroke, the patient was immediately transferred to the Stroke Unit, where was performed intravascular treatment of mechanical thrombectomy. In the intervention room, the patient was in the sixth hour starting from the first signs of stroke.



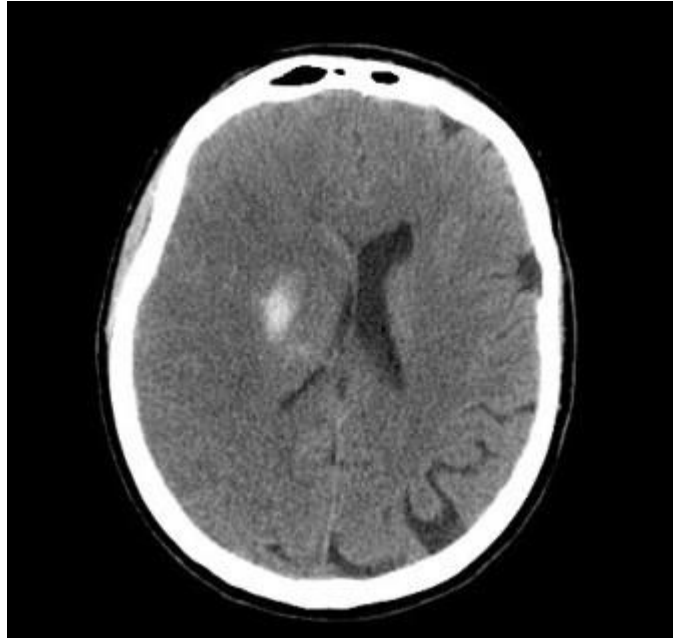
**Figure 1. Arteriography before ICA recanalization**

The angiographic examination showed obstruction of the right internal carotid artery in the C3 segment (Figure 1). The thrombus from the carotid artery was then aspirated, then the thrombectomy was cleared of the right cerebral arteries, resulting in complete recanalisation. On the Trombolysis In Cerebral Infarction scale (TICI) 3 points were obtained. (Figure 2).



**Figure 2. Arteriography after ICA recanalization**

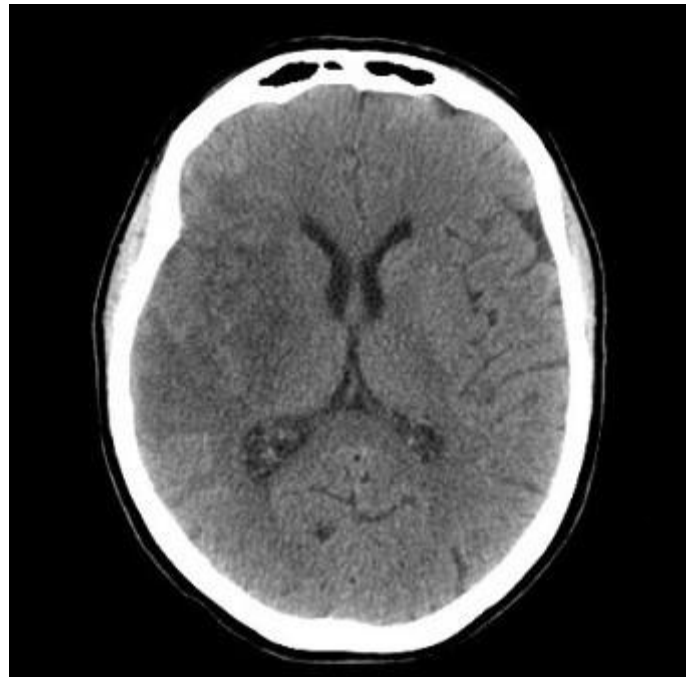
In the control CT of the head performed a day after the procedure, a 2 x 1 cm hyperdense focus was visible in the deep right hemisphere structures, probably extravasate contrast, and bleeding could not be excluded (Figure 3).



**Figure 3. Control CT head after 24 hours**

The swelling of the right hemisphere of the brain with the extensive ischemic area of the parietal region, with the compression of the right lateral chamber and displacement of the median structures towards the left by 3 mm was also shown. During the hospitalization, transthoracic echocardiography was performed, which describes segmental contractility disturbances with a significantly impaired ejection fraction (29%). The diagnosis was extended by transoesophageal echocardiography, which showed a left-right flow through the Botalli foramen with a width of approx. 3mm, with no visible reversal of leakage after contrast administration. The patient was consulted by a cardiologist. Anticoagulant therapy was recommended, cardiac check with possible electrotherapy (ICD), and to close the surviving Botalli foramen. The patient was evaluated by an angiologist who excluded the abnormalities in the venous system. Due to arterial thrombosis in two vascular areas and a high probability of thrombophilia, it was recommended to use anticoagulant therapy until complete diagnostics in the Angiology Clinic for 3 months after stabilization of the coagulation system. In Duplex Scan, the carotid arteries did not show significant haemodynamic stenoses. In the 24-hour heart rate monitoring study, no significant changes were observed. The sugar curve showed abnormal glucose tolerance and the diabetic diet was included. In the control CT of the head performed thirteen days after the cerebral infarction, 80 mm ischemic area in the temporo - parietal - frontal right region, right cerebral hemisphere

edema, ventricular system width normal, without displacements of the median structures (Figure 4).



**Figure 4. Control CT head after 13 days**

A histopathological result was obtained from changes in the skin layers of the head - a mild change - proliferating hair cyst. During 19 - day hospitalization the patient was intensively rehabilitated. She was discharged from the ward as independent, with slight hemiparesis (NIHSS 4 pt.). According to specialist consultations, it was recommended to take dabigatran in a therapeutic dose. The patient was directed to further rehabilitation in the Clinic of Rehabilitation. Three months later, the patient had a diagnosis for coagulation disorders - in the tests without significant changes.

## Discussion

Acute ischemia with progressive necrosis, which develops rapidly in the first hours after arterial thrombosis is the main feature of acute myocardial infarction and acute ischemic stroke. Both of these diseases are the main causes of death throughout the world. Restoration of blood flow in a closed artery and reperfusion of ischemic tissue is the most effective therapy in both diseases. Reperfusion stops the progression of necrosis and keeps the living tissue of the myocardium and the penumbra area [5]. Co-occurrence of myocardial infarction and stroke is a huge challenge for the clinician, an emergency, requiring immediate intervention. The cardiac muscle and the brain are very sensitive to hypoxia. Immediate reperfusion therapy performed in the right time window is the optimal procedure to protect both important organs and is associated with a lower risk of bleeding [6]. It is important to consider whether intravenous thrombolysis is appropriate for a patient with myocardial infarction and ischemic stroke. The use of intravenous thrombolysis in stroke patients with recent myocardial infarction is associated with an increased risk of myocardial rupture, secondary to the breakdown of an existing fibrin clot in necrotic myocardium and / or collagen degradation. Among the factors increasing the risk of rupture of the heart wall and tamponade are age, female sex, myocardial infarction, longer period from the beginning of symptoms to thrombolysis and pericardium occupation. The total incidence of these complications is about 1% in patients thrombolized in acute coronary syndrome. In summary, the limitations of knowledge, the lack of standard protocols, therapeutic decisions in the case of concomitant myocardial infarction and acute ischemic stroke should be individualized. Risk factors for cardiac tamponade and potential heart failure should be considered. The use of alteplase should not be avoided in patients with ischemic stroke and myocardial infarction in the absence of the above risk factors for cardiac complications associated with intravenous thrombolysis [7]. The relationship between the anterior infarction and the left ventricle thrombus, which was supposed to lead to ischemic stroke, was also investigated. No relationship was found between stroke and the location of myocardial infarction. Thus, there is no causal relationship between myocardial infarction, thrombus and stroke [8]. In the patient described by us, intravenous thrombolysis was withdrawn due to the operation two days earlier, the unclear nature of the left parietal tumor removed and the extent of stroke. Intravascular treatment of mechanical thrombectomy was used. Polish experience on mechanical thrombectomy was published in early 2017. The analysis collected data from 25 centers, which in 2012 - 2016 performed 586 procedures. The majority of patients have used



classical thrombectomies - stent retrievers. An impressive result of effective recanalization (TICI 2b and 3) was achieved at 64.6%. It should be mentioned that these procedures were performed without standardized protocols [9]. Criteria for inclusion in mechanical thrombectomy are confirmed by CT or Magnetic Resonance Imaging (MRI) of a large artery occlusion in the anterior region of the cerebral vascularization (M1 segment of the middle cerebral artery or internal carotid artery). There should be a clinically significant neurological deficit (NIHSS > 5 points). It should be noted that a small deficit caused by a documented occlusion of a large artery is associated with a high risk of deterioration of the patient's condition. The patients with large early-onset ischemic changes in the CT scans (in the The Albert Stroke Early Computer Tomography Score program - ASPECTS > 5 points) have clear benefits. Patients who were in good functional status prior to stroke (modified Rankin scale < 2 points) without major comorbidities have the greatest benefits. It should be noted that age > 80 is not an exclusion for treatment. The time criterion includes performing mechanical thrombectomies up to 6 hours after the onset of neurological symptoms [10]. The described patient was disqualified from the treatment of intravenous rtPA infarction in Stroke Unit, to which she was originally brought. In such a situation, the only chance in case of closing a large artery vessel is a mechanical thrombectomy. Risk factors for myocardial infarction and myocardial infarction are in most cases the same. However, the occurrence of these two acute events at the same time is not widely described in the literature, and in clinical work it is not frequent. Therefore, suspected coagulation disorders in the presented clinical case were highly probable. After a 3-month grace period, the study at the Clinic of Angiology did not confirm the hypothesis. However, the patient requires further constant angiological, cardiological and neurological control. The question of closing the surviving Botallio foramen, re-performing Holter and further genetic testing remains to be considered. [11].

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