






Paradoxical embolism wedged in PFO as a cause of stroke and pulmonary embolism in a 63-year-old woman

Zator skrzyżowany zaklinowany w PFO jako przyczyna udaru mózgu i zatorowości płucnej u 63-letniej kobiety

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Abstract

This study presents the case of a 63-year-old patient hospitalised due to a stroke. Additional tests showed that the stroke was the result of a paradoxical embolus wedged within the foramen ovale, which was visualised by transthoracic echocardiography. Due to the overall clinical picture, the presented patient underwent anticoagulant treatment, which allowed for the resolution of the thrombus and improvement of her general condition.

Keywords: PFO, embolism, stroke, pulmonary embolism

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Case description

A 63-year-old female patient without a history of chronic diseases, with long-standing nicotinism and alcohol dependence syndrome, was admitted to the Department of Neurology for a cerebral ischaemic stroke, with profound left-sided pyramidal paresis. A non-contrast computed tomography (CT) scan of the head showed an extensive hypodense area of acute ischaemic stroke in the right cerebral hemisphere involving the middle and inferior frontal curve, the periventricular part of the frontal lobe, parietal lobe, temporal lobe, insula and striatum [Fig. 1]; in addition, an angio-CT scan confirmed a full-length obstruction of

the right middle cerebral artery. Because the therapeutic window from the onset of the patient's symptoms was exceeded, percutaneous thrombectomy of the cerebral artery was not attempted. CT scans of the head performed on consecutive days allowed visualisation of the evolution of the stroke in the right cerebral hemisphere, the enlargement of the stroke focus and subsequent haemorrhage of the stroke focus in the deep structures. To search for cardiac causes of the stroke, an electrocardiogram (ECG) was performed, which diagnosed atrial flutter with a ventricular rate of 85–150/minute. A cardiac echo was also performed, which showed a large longitudinal lesion within the right and left atrium — an image characteristic of a thrombus wedged

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Figure 1. Computed tomography of the head without contrast – an area of hypodense acute ischaemic stroke in the right cerebral hemisphere (study performed on day 3 of hospitalisation).

within the atrial septum, passing through a persistent oval opening (PFO) [Fig.2, Figs. 3a, 3b, 3c].

The diagnosis was expanded with an ultrasound examination of the veins of the lower limbs, which showed thrombosis of the deep veins of the left lower limb with a visible ballooning thrombus in the lumen of the popliteal vein. To extend the diagnosis, pulmonary artery angiography (angio CT of the pulmonary arteries) was also performed, which visualised massive central embolism (including a band of embolic material in the pulmonary trunk division and bilateral embolic material in the lobar and segmental arteries) [Fig.4]. In the right and left atrium, banded filling cavities corresponding to thrombi that had previously been visualised by echocardiography were present.

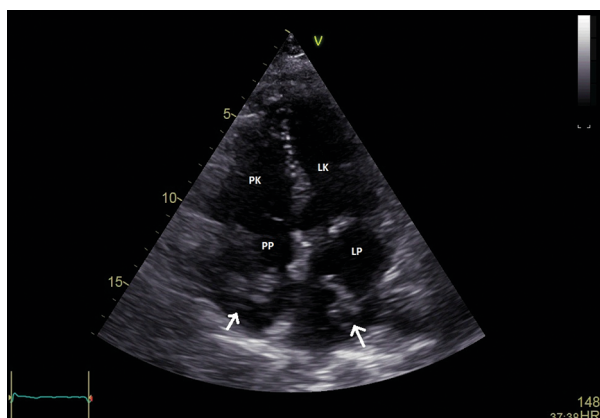


Figure 2. Transthoracic echocardiography – apical four-chamber view; longitudinal thrombus visible in the right and left atria, passing through the persistent oval opening. The arrow indicates the thrombus seen in the right and left atrium. Legend: LV – left ventricle, PK – right ventricle, LP – left atrium, PP – right atrium. The arrow indicates the thrombus seen in the right and left atrium.

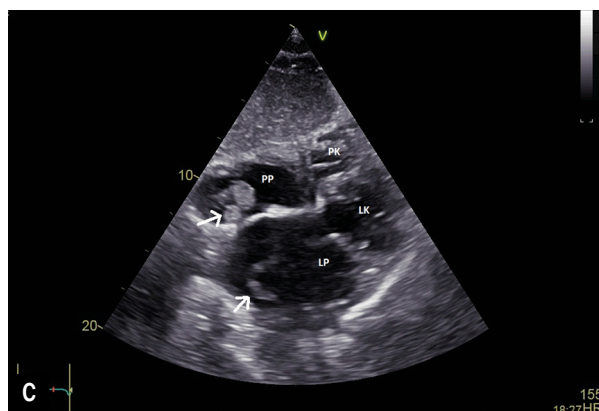
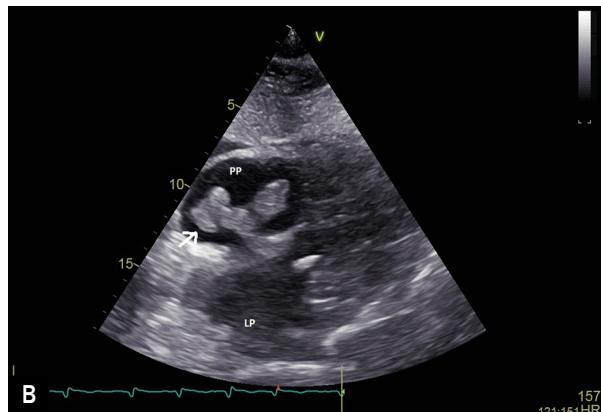
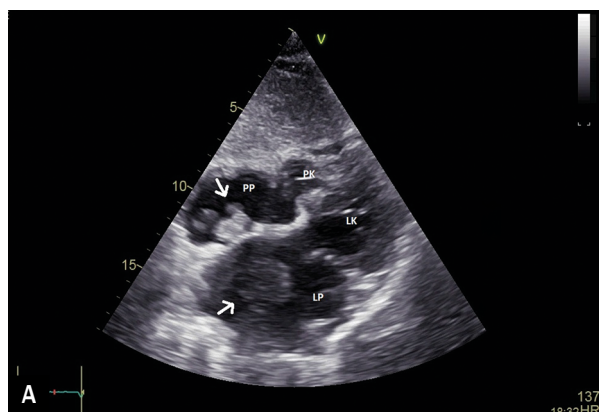
The patient was consulted for cardiac surgery – disqualified from surgical treatment. She was transferred to the Cardiology Department for further treatment. During hospitalisation, low-molecular-weight heparin was administered, achieving complete lysis of the thrombus seen in the atria, which was confirmed by a follow-up echo heart examination. The patient had no new neurological deficits. On the 40th post-stroke day, dabigatran was used as a continuation of anticoagulant treatment. The patient also had a follow-up echo, which showed a spontaneous return of sinus rhythm.

The patient was discharged to a residential care facility due to disability.

Discussion

Stroke is one of the most common causes of death in developed countries. Each year, an estimated 795,000 people experience their first or subsequent stroke in their lifetime [1]. Cardiovascular causes of stroke account for 15% to 40% of the causes of all ischaemic strokes [2]. The most common source of embolism, in this case, is atrial fibrillation (AF); rarer sources (in the absence of AF) include intracardiac thrombi, cardiac tumours, cardiomyopathies with impaired left ventricular systolic function, endocarditis, artificial valves, calcification of the aortic and mitral valves and PFOs [3].

The PFO is a remnant of the oval opening that connects the right and left atria of the heart during foetal life. It remains unobstructed and is an incidental finding in 25% of healthy individuals [4]. In ischaemic stroke patients, it is found more frequently in up to 40% of patients [5]. However, in some individuals, full closure does not occur – the PFO remains in place of the oval opening. Under conditions of increased pressure in the right atrium, it may open briefly, facilitating the passage of a thrombus from the right to the left atrium (cross-clamping), leading, as in the case of



Figures 3a, 3b, 3c. Transthoracic echocardiography – subcostal four-chamber view, thrombus visible in the right atrium, passing through the persistent oval opening into the left atrium. The arrow indicates the thrombus seen in the right and left atrium. Legend: LV – left ventricle, PK – right ventricle, LP – left atrium, PP – right atrium.

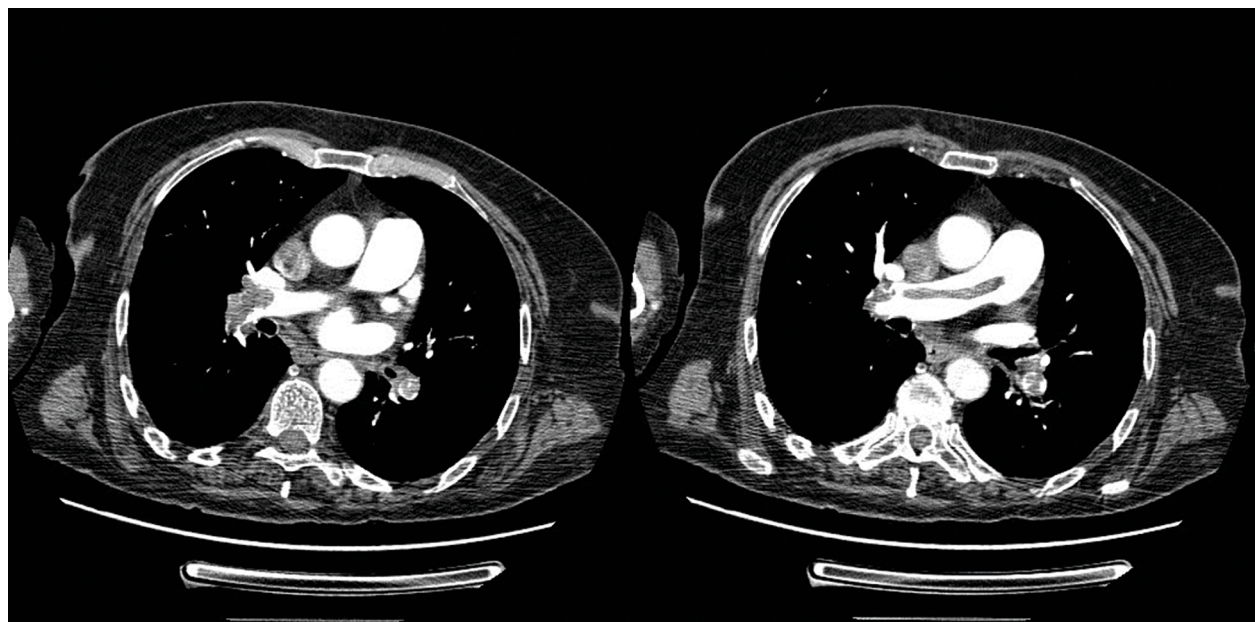


Figure 4. Computed tomography of the thoracic arteries – angiographic study – a band of embolic material in the pulmonary trunk division, penetrating the right pulmonary artery, present in the division.

the patient described, to an ischaemic stroke. In addition to electrocardiography (12-lead ECG and/or prolonged ECG recordings), transthoracic echocardiography (TTE) and transoesophageal echocardiography (TEE) are among the key investigations performed in patients after ischaemic stroke to exclude cardiac causes. In the case of the patient described here, while performing TTE, an unusual situation was registered – a large thrombus, probably originating from the deep veins of the left lower limb, wedged

within the PFO, being the source of both small circulation embolism and ischaemic stroke. Even with optimal management, a thrombus in a PFO is associated with a 30-day mortality rate of 18% [6]. Possible treatment options include cardiac surgery, fibrinolytic treatment, embolectomy, or anticoagulant treatment. Given the overall clinical picture, anticoagulant treatment was chosen in the presented patient, resulting in thrombus resolution, and improvement in general and neurological status.

Streszczenie

W niniejszej pracy przedstawiono przypadek 63-letniej pacjentki hospitalizowanej z powodu udaru mózgu. Badania dodatkowe wykazały, że udar był wynikiem zatoru skrzyżowanego zaklinowanego w obrębie otworu owalnego, co udało się uwidocznić w przezklatkowym badaniu echokardiograficznym. Ze względu na całokształt obrazu klinicznego u prezentowanej pacjentki zastosowano leczenie przeciwkrzepliwe co pozwoliło uzyskać rezolucję skrzepliny oraz poprawę stanu ogólnego.

Słowa kluczowe: PFO, skrzeplina, udar niedokrwienny mózgu, zatorowość płucna

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Additional information

Ethic statement

All ethical rules required for this type of publication have been complied with.

Author contribution

All authors were identified and accepted the final version of the text.

Conflict of interest

The Authors declare no conflict of interest.

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