CASE REPORT

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Limb ischemia, an alarm signal to a thromboembolic cascade – renal infarction and nephrectomy followed by surgical suppression of the left atrial appendage

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Abstract

We present the case of a 55-year-old male with mild hypertension and brief episodes of paroxysmal self-limiting atrial fibrillation (AF) since 2010. Despite a small cardioembolic risk score, CHA2DS2-Vasc=1 (Congestive heart failure, Hypertension, Age≥75, Diabetes melitus, prior Stroke), the patient is effectively anticoagulated using acenocumarol. In December 2014, he showed signs of plantar transitory ischemia, for which he did not address the doctor. In early January 2015, he urgently presented at the hospital with left renal pain, caused by a renal infarction, diagnosed by computed tomography (CT) angiography. Left nephrectomy was performed with pathological confirmation. He was discharged with effective anticoagulation treatment. Within the next two weeks, he suffered a transitory ischemic event and a stroke, associated with right sided hemiparesis. On admission, AF was found and converted to sinus rhythm with effective anticoagulation – international normalized ratio (INR) of 2.12. Transthoracic echocardiography detected no pathological findings. Transesophageal echocardiography showed an expended left atrial appendage (LAA) with a slow blood flow (0.2 m/s) and spontaneous echocontrast. Considering these clinical circumstances, surgical LAA suppression was decided on as a last therapeutic resort. Postoperative evolution was favorable; the patient is still free of ischemic events, one year post-intervention. Some morphological and hemodynamic characteristics of LAA may add additional thromboembolic risk factors, not included in scores. Removing them by surgical LAA suppression may decrease the risk of cardioembolic events. Intraoperative presence of thrombus makes it an indisputable proof.

Keywords: limb ischemia, atrial fibrillation, renal infarction, left atrial appendage.

Introduction

In patients with atrial fibrillation (AF), cardioembolic event prophylaxis is recommended in all worldwide guidelines, based on numerous randomized, multicentric trials [1, 2]. Cardioembolic risk stratification according to approved scores CHADS2 and CHA2DS2-Vasc enables us to more easily make a decision on the need for anti-coagulation [3]. However, there are situations in which patients with low risk scores develop thromboembolic events (TE). It seems that other factors not included in the above mentioned scores, such as atrial size, left atrial appendage (LAA) configuration and its relation to the pulmonary veins, blood flow velocity through LAA can participate in the cardioembolic risk [4, 5]. It is certain, though, that the LAA is an important source of thrombus [6]. In case of major contraindications to anti-coagulation and when the circumstances require it, in patients with AF, a suitable alternative could be the isolation of the LAA [7].

The aim of this paper is to present a rare, challenging case of LAA thrombogenic configuration leading to multiple TE in a low-risk cardiac patient, despite the small cardioembolic risk and a correct anticoagulant therapy. This case is an example of rare situations when cardiac patients can develop TE, apparently unjustified by the current international algorithms of clinical risk assessment.

Case presentation

We present the case of a 55-year-old male with mild hypertension and brief episodes of paroxysmal self-limiting AF since 2010. Despite a small cardioembolic risk score, CHA2DS2-Vasc=1 (in which guidelines recommend anticoagulation as optional), the patient was effectively chronically anticoagulated using acenocumarol. In December 2014, he showed signs of transitory peripheral ischemia associated with paresthesia, pain, pallor and coldness, suddenly occurred on plantar level. The apparent state of health and the fact that symptoms disappeared after 8–10 hours, made the patient decide not to address a doctor. In early January 2015, he urgently presented to the hospital with left renal colic pain. Routine ultrasound revealed no pathological aspects of the right kidney, no lithiasis in the left kidney, but lack of left renal paren-chyma vascularization. A native computed tomography (CT) scan and also using intravenous dye was then recommended and performed on the abdominal and pelvic regions. It showed: complete absence of contrast opacification of the left renal artery at its origin – 14 mm

distal from the abdominal aorta, lack of secretion and excretion of the left kidney in arterial phase, postcontrast capsular opacification, and a minimum cortical opacification of the parenchyma, during late venous phase, located in the inferior renal pole; calcium deposits of the abdominal aorta, both right and left, common, internal and external iliac arteries and renal artery at its origin. This feature was conclusive for the occlusion of the left renal artery and consecutive renal infarction. Left laparoscopic nephrectomy was performed with favorable postoperative outcome. Histopathological findings revealed at macroscopy: a 13×9×5 cm kidney, with multiple pale-whitish shapely demarcated areas, some with small irregular foci of hemorrhagic discoloration, and clots in the hilum vessels; at microscopy: thrombosis of the renal artery and its branches, with extensive ischemic coagulative necrosis of the renal parenchyma (Figures 1 and 2) was found. On admission, the patient was effectively anticoagulated (international normalized ratio – INR 3.08) and was discharged undergoing anticoagulation therapy as well. Within the next two weeks, he suffered a transitory ischemic event and a stroke, associated with right side hemiparesis, considered to be carotid related, because Doppler examination revealed several non-stenotic atheromatous plaques involving both the common and the internal carotid arteries on each side. After four-suspected cardioembolic events occurred in the last three months due to recurrent paroxysmal AF and under continuous anticoagulant therapy correctly followed, the patient was admitted on February 24, 2015. Clinical and paraclinical investigations were directed to finding some other still unidentified factors, which may have been responsible for the events described.

Laboratory results: hemoglobin (Hb) 13.7 g/dL, white blood cells count (WBCs) 10 100/mm^3, platelets (PLTs) 289 400/mm^3, erythrocyte sedimentation rate (ESR) 16 mm/h, blood glucose (BGL) 80 mg/dL, cholesterol (CHOL) 207 mg/dL, triglycerides (TG) 167 mg/dL, creatinine (CREA) 1.34 mg/dL; negative tests for liver function; INR 2.12 under anticoagulant therapy. Transthoracic echocardiogram excluded any valve lesions, dilatation of cavities, kinetic disorders, decreased ejection fraction and intracavitar thrombus. Lower limb Doppler echography visualized non-stenotic, stable, multileveled atheromatous plaques. Venous ultrasonography: no thrombus, no venous insufficiency. Transesophageal echography showed a minor atrial septal defect with a left to right shunt with no hemodynamic significance, an expended LAA with a slow blood flow (0.2 m/s) (Figure 3) and spontaneous echocontrast, suggesting a condition for thrombus formation (Figure 4).

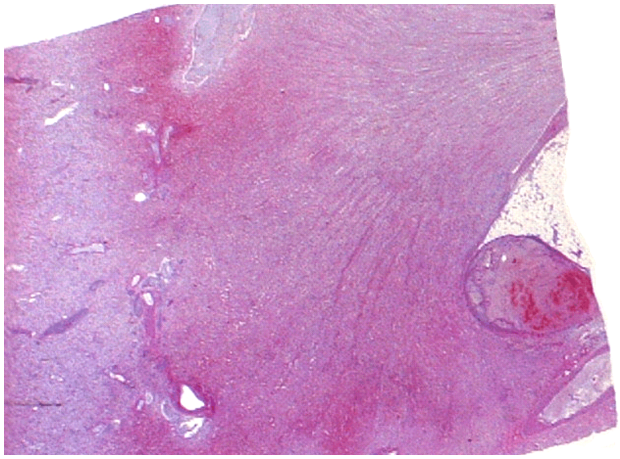

Figure 1 – ***Thrombus in a branch of the renal artery (on the left), associated with extensive renal infarction. HE staining, ×40.***

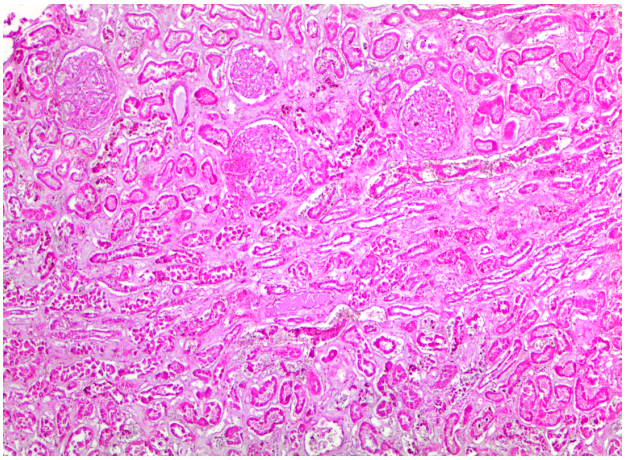

Figure 2 – ***Coagulative necrosis of the renal parenchyma: detail. HE staining, ×100.***

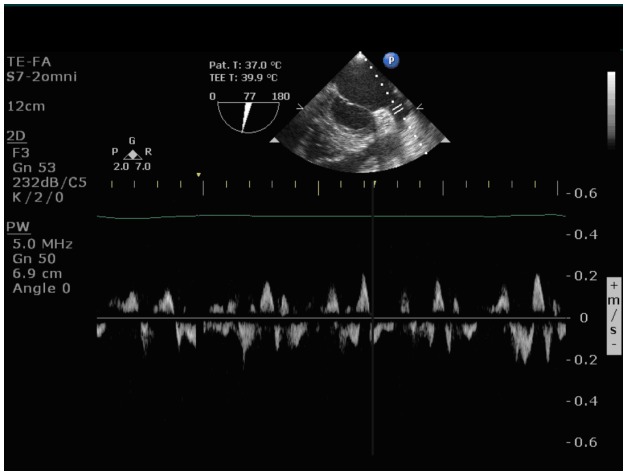

Figure 3 – ***Cardiac ultrasound – intra-auricular slow blood flow.***

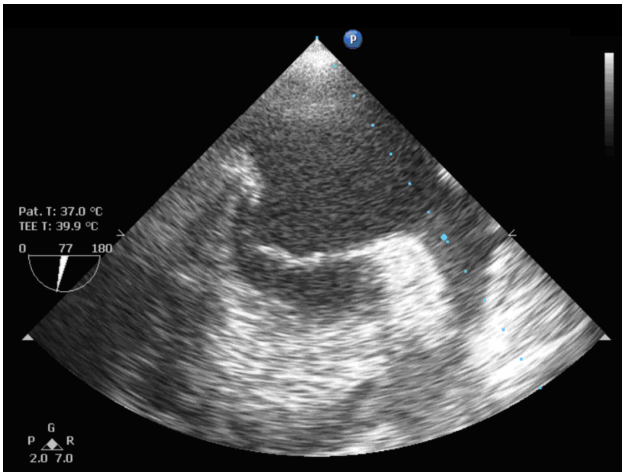

Figure 4 – ***Spontaneous echocontrast – suggesting a prothrombotic condition.***

Considering these clinical circumstances, we presumed that the morphological (expended LAA) and hemodynamic (slowed blood flow) characteristics of LAA could represent correctable factors responsible for cardioembolic events. Surgical LAA suppression was therefore decided on as a last therapeutic resort, prior to cardiac surgery examination. In April 2015, a surgical external ligature of the LAA was performed. Intraoperatively, an expended LAA was found, with a cauliflower aspect due to a lobular configuration, as literature also describes (Figure 5); an intra-auricular thrombus was also found.

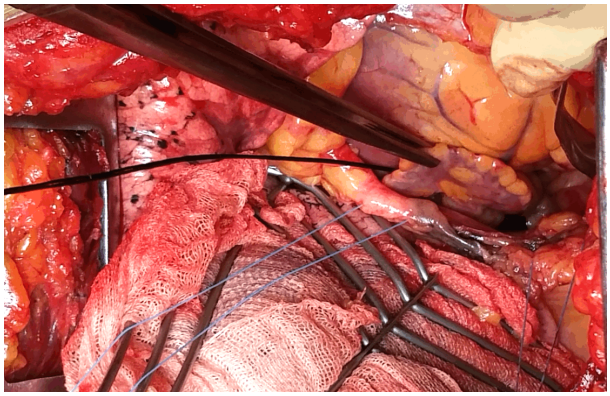

Figure 5 – ***Cauliflower-shape LAA and its external surgical ligation.***

Postoperative recovery was good, with complications. One year later, the patient is still free of ischemic events, with no recurrence of AF episodes (under anti-arrhythmic therapy). Currently, the patient has had a full cardiovascular recovery, but still showing a slight nitrogen retention (serum creatinine value varies between 1.3–1.8 mg/dL) after nephrectomy.

Discussion

Clinical outcome research in AF continues at a fast pace. Also, considerably more clinical experience has been gathered in the fields of anticoagulation, atrial appendage occlusion, antiarrhythmic drug use for cardioversion and rhythm control, and left atrial ablation [8].

It is believed that success in preventing strokes, particularly, and cardioembolic events depends on the doctor's concern and ability to detect paroxysmal AF episodes and also the correctness of applying the treatment guidelines. Detection and correct treatment of AF before the first embolic event occurs usually ensure stroke prevention success [9]. AF is a key element of intra-auricular thrombogenesis, when LAA has a predisposing configuration for slowing blood flow. In literature, this configuration was identified by CT spatial processing. CT scans identify four shapes of LAA conformations that favor local thrombogenesis – "cactus", "windsock", "chicken wing", "cauliflower" [6].

Our case is peculiar since the patient, despite a small cardioembolic risk score – CHA2DS2-Vasc=1, benefited from correct anticoagulant treatment, although European and American guidelines state that in these cases patients may not be or may optionally be anticoagulated [3, 7]. Ischemic events and strokes have different clinical manifestation and in most cases have a common cause – atherosclerosis or thromboembolism. When patients have episodes of AF, even of short duration (seconds, minutes), embolism is most likely involved [10, 11]. Moreover, ischemic events occurred in our case at short time intervals and in different areas: leg, kidney, brain (all within three months). When patients suffer an ischemic event related to AF, guidelines recommend anticoagulation and insist on stroke recurrence prevention, but do not recommend additional therapeutic interventions [12]. The 2014 AF treatment guidelines advise that surgical ligation of the LAA should be performed only in patients undergoing cardiac surgery; a patient with no surgical indication, coronary artery bypass (CAB) or valve surgery, is not even considered for this procedure [7]. In our case, we were in a therapeutic impasse, as the patient suffered already four cardioembolic events that occurred under a properly managed and effective anticoagulant. We wonder whether suppressing the LAA can be a therapeutic solution. On the assumption that in patients with AF, LAA morphology has been suggested to modify TE risk, we hypothesized that TE in low-risk patients could be associated with LAA characteristics [6]. Indeed, the transesophageal ultrasound examination showed in our patient an expended LAA with slow blood flow and spontaneous echocontrast, conditions that may favor local thrombus formation, responsible for previous embolic events. A study presented (as an oral abstract) at the *American College of Cardiology* in the 2015 Scientific Sessions, casts some doubt regarding LAA suppression. On a total of 468 patients who had CAB and LAA closure, the results were unfavorable, meaning that AF recurrence and mortality were significantly higher compared to patients with CAB but without LAA closure; stroke incidence was the same in the two groups [13]. Considering that the complex morphology of LAA was a risk factor for thrombus formation, as it was shown in a prospective series of patients with AF, independent of clinical predictors and echocardiographic markers of blood stasis [14], we decided on LAA surgical suppression, not having the possibility to use occluder devices by interventional methods, as recommended [15]. The patient was subjected to LAA surgical external ligation. The cauliflower conformation of the LAA, prone to thrombogenesis, and the clot found intraoperatively, inside the LAA, supports our aggressive therapeutic decision. Adding cauliflower to one's diet would generally be considered a change for a better health, but an LAA shape reminiscent of a cauliflower on CT scan could be a cautionary sign [14].

Conclusions

Morphological and hemodynamic characteristics of the left atrial appendage, associated with some other ultrasound modifications, especially a slow intra-auricular blood flow and spontaneous echocontrast, may add additional thromboembolic risk factors, not included in the scores. Removing them by LAA suppression may decrease the risk of cardioembolic events. Surgical external ligation of the LAA is an extreme therapeutic fdecision that should be performed only in exceptional circumstances. In our case, the intra-auricular thrombus was the most powerful argument to support the diagnostic hypothesis and the surgical decision.

Conflict of interests

Authors declare no conflict of interests.

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