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Case Report

CASE REPORT

Cerebral paradoxical embolism associated with patent foramen ovale and idiopathic venous thromboembolism in a 31-year-old patient

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Abstract

Paradoxical embolism is the passage of venous thrombi into the arterial circulation through a pulmonary or intracardiac shunt. We report the management of a 31-year-old patient who initially presented with chest pain and right brachiofacial paresis. A diagnosis of paradoxical cerebral embolism associated with a spontaneous venous thromboembolism and a patent foramen ovale was made. The patient benefited from thrombolytic therapy and lifelong anticoagulation with good recovery. This case showed that percutaneous closure of a patent foramen ovale needs to be discussed individually.

INTRODUCTION

Venous thromboembolic disease (VTE) can be associated with common complications like hemodynamic complications, or less common ones like paradoxical emboli (PDE). Thrombi can pass into the systemic circulation through a pulmonary or intracardiac shunt. VTE is a multifactorial disease but it can also occur without any identified predisposition [1]. Among the causes of intracardiac shunt, patent foramen ovale (PFO) accounts for 25–35% [2]. The presence of a PFO is significantly associated with stroke recurrence in patients with pulmonary embolism (PE) [3, 4]. We report the management of a 31-year-old patient with paradoxical cerebral embolism associated with a spontaneous VTE.

CASE REPORT

A 31-year-old man was admitted to the emergency department for a sudden hemiparesis and a fluctuating chest pain, which started 3 days prior to admission. His past medical history included active smoking and venous thrombosis. He had no previous history of cardiac murmur. Physical examination revealed a pulse rate at 92, blood pressure at 110/83 mmHg, a right sided facio-brachial paresis, aphasia. His National Institute of Health Stroke Score (NIHSS) was 24. The electrocardiogram was normal. Laboratory tests revealed a troponin at 44.5 ng/L, D-dimer at 6000 pg/L. Arterial blood gas while receiving 2 L of oxygen revealed a ph of 7.46. Brain magnetic resonance imaging (MRI) showed a recent small infarction in the left middle

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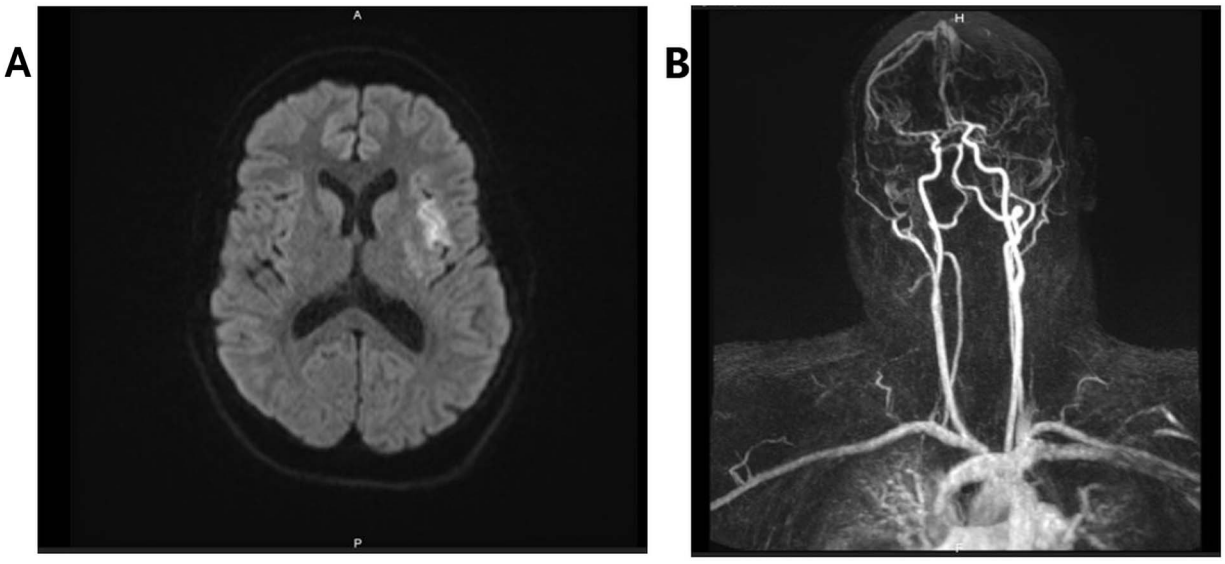

Figure 1: (**A**) MRI showed a recent infarct in the MCA territory (**B**) MRI showed an occlusion extending from the bifurcation to the M2 segment .

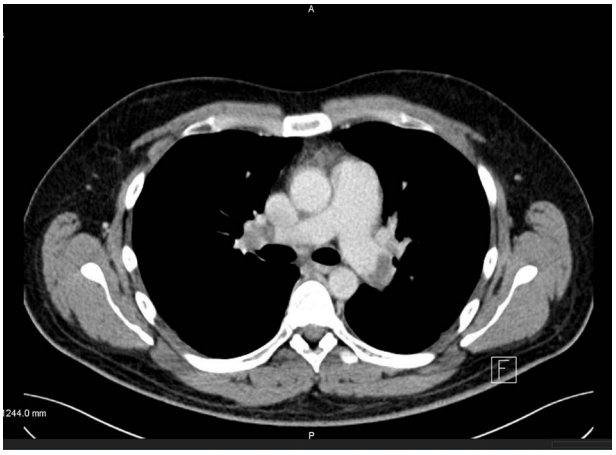

Figure 2: Computerized tomography pulmonary angiogram showed bilateral thrombi in the pulmonary arteries.

cerebral artery (MCA) territory (Fig. 1A) with thrombi at the MCA bifurcation and continuing into the M2 segment (Fig. 1B). Computed tomography (CT) pulmonary angiogram showed bilateral proximal PE (Fig. 2). Deep vein thrombosis (DVT) was found in the left lower limb (Fig. 3). Transthoracic echocardiogram (TTE) showed a pulmonary arterial hypertension at 110 mmHg, right ventricle dilation and a paradoxical septum.

A diagnosis of acute ischemic stroke with a proximal large vessel occlusion (LVO), associated with left lower limb DVT and bilateral PE was made. The patient benefited from fibrinolysis 2 h and 30 min after the beginning of his symptoms. He was scheduled for mechanical thrombectomy, which was not finally performed due to clinical improvement of his neurological state. The NIHSS score was reassessed at 2 ~6 h after the fibrinolysis. There was no hemorrhage on the post-thrombolytic head CT scan.

The initial thrombophilia panel and the 48-h Holter monitoring were normal. TEE found a PFO with moderate right-left shunt and a mobile thrombus at the bottom of the left auricle (Fig. 4). The PFO and the shunt were confirmed on duplex sonography of the cervical arteries with Valsalva maneuver.

This case was discussed in a multidisciplinary meeting with cardiologists, neurologists, hematologists and no surgical treatment was indicated for the PFO at that time. Our patient benefited from anticoagulation with low molecular weight heparin followed by a lifelong vitamin K antagonist (VKA) with INR ranging from 2 to 3 during follow-ups. No thrombotic or embolic events occurred at >1 year of follow-up with a control systolic pulmonary arterial pressure at 30 mmHg.

DISCUSSION

Three criteria must be present for a diagnosis of paradoxical embolism: the presence of a VTE, an intra-cardiac shunt or a pulmonary fistula and an arterial embolism [5]. Our patient had a DVT complicated with on one side a bilateral PE and on the other side, an ischemic stroke, which was due to a patent foramen ovale. PDE often manifests as an ischemic stroke and a PFO is often the cause [5].

Our patient's management consisted in treating first the acute ischemic stroke and then the PE [6, 7]. Based on the duration of symptoms onset of <3 h, the initial NIHSS score ≥ 6 and the proximal occlusion of the left MCA, a thrombolysis followed by a mechanical thrombectomy were primarily indicated [7].

Several therapeutic means exist for the management of PDE associated with PFO; a percutaneous or surgical closure of the foramen, a long-term antiplatelet therapy, which might be combined with anticoagulant, or a placement of an IVC filter when there are contraindications [8]. Collabo *et al.* [9] reviewed multiple randomized trials that showed superiority of percutaneous closure over medical treatment for the prevention of recurrent stroke in high-risk phenotypes patients with prior cryptogenic strokes. Parikh A *et al.* [10] also reported good long-term evolution when a PFO closure was added to a long-term anticoagulation in a patient with PDE, PE, a large PFO and thrombophilia.

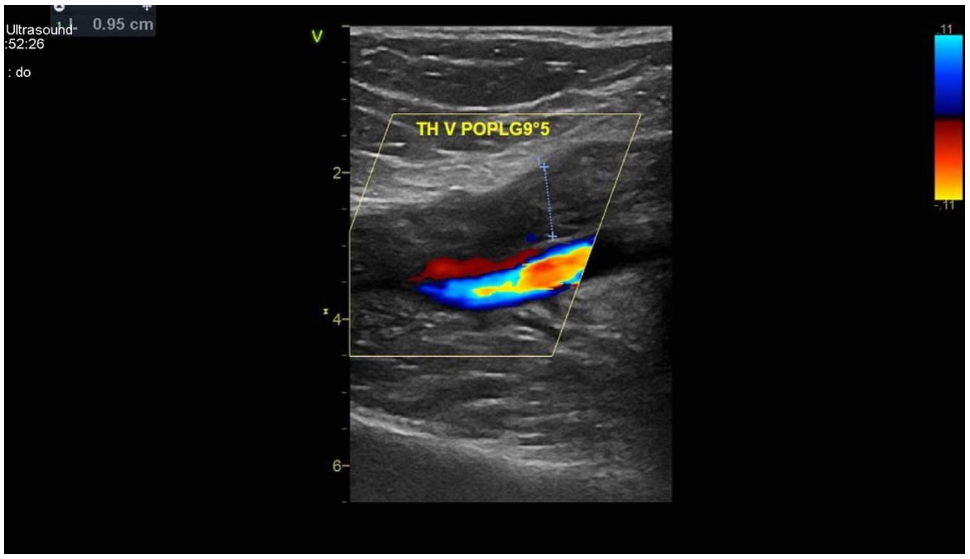

Figure 3: Lower extremity venous ultrasound showed a thrombus in the left popliteal vein.

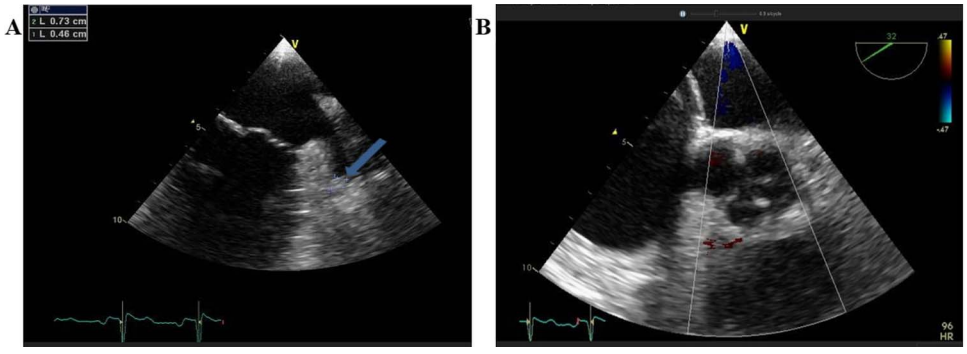

Figure 4: TOE showed a thrombus in the left atrium and a patent foramen ovale.

Percutaneous closure is justified in case of recurrent cryptogenic stroke in young patients (<55 years) with evidence of venous thrombosis and should be considered in patients with first-time cryptogenic stroke, particularly in those with high-risk criteria, such as presence of an atrial septal aneurysm, septal hypermobility, large PFO, Eustachian valve or Chiari network [5]. Our patient was considered as a lower-risk phenotype and we assumed that the severe pulmonary hypertension led to the moderate shunt and the passage of thrombi into the systemic circulation. We decided to put him on lifelong anticoagulation with subsequent follow-ups to evaluate the need for a complementary PFO closure.

It was his second spontaneous VTE, which was associated with right ventricle dilation and a severe pulmonary hypertension at the acute phase. This could suggest a pre-existing increase in pulmonary vascular resistance predisposing to a chronic thromboembolic pulmonary hypertension (CTEPH). We favored long-term VKA over direct oral anticoagulants (DOAC) because no prospective study has so far demonstrated the efficacity and safety of DOAC in patients undergoing thrombolysis and because of the possible CTEPH [6].

Subsequent follow-ups were uneventful. This stresses out the need to characterize patients before deciding on the therapy. Pending conclusive recommendations, percutaneous closure would then be performed only in specific situations.

CONFLICTS OF INTEREST

None declared.

FUNDING

None.

ETHICAL APPROVAL

No approval was required.

CONSENT

The patient provided written informed consent.

GUARANTOR

Dr. Jean Timnou Bekouti.

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