

Pulmonary embolism and renal artery thrombosis in a patient with patent foramen ovale

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Abstract. *Background and aim:* Paradoxical embolism is a rare condition in which a thrombus migrates from the venous system to the arterial circulation, usually through a patent foramen ovale (PFO). Pulmonary embolism (PE) and isolated occlusion of one renal artery has been seldom reported. *Methods:* We describe a case of a 47-year old white man with a one-month history of exertional dyspnea who was admitted to our hospital for severe pain in the right lumbar region. *Results:* A computed tomography showed PE and a thrombotic occlusion of the right renal artery. A trans-thoracic echocardiogram documented a PFO with right to left shunt. Magnetic resonance imaging of the brain and venous compression ultrasonography of the lower extremities were normal. Therapeutic anticoagulation was started. *Conclusions:* PE and thrombotic occlusion of one renal artery is a rare manifestation of paradoxical embolism. Exertional dyspnea is an atypical manifestation of PE and can delay the diagnosis. (www.actabiomedica.it)

Key words: Paradoxical embolism, pulmonary embolism, renal artery thrombosis.

Introduction

The term paradoxical embolism refers to a rare condition in which a thrombus migrates from the venous system to the arterial circulation, usually through a patent foramen ovale (PFO) (1). The arteries more frequently interested are those of the brain and of the extremities (1-4). We report a case of right renal artery occlusion coexisting with pulmonary embolism (PE) and PFO.

Case Report

A 47-year old white man was admitted to our hospital for severe pain in the right lumbar region. His clinical history was significant only for a body mass index of 35 and for an exertional dyspnea that had started one month earlier. For this symptom the patient had undergone an EKG and a trans-thoracic

echocardiogram that had yielded normal results. The physical examination was remarkable for severe right lumbar pain. The laboratory exams were significant for an increase of the serum creatinine (2.0 mg/dl, normal range 0.6-1.1), Alanine amino-transferase (145 U/L, normal range 5-40) Protein C Reactive (128 mg/dl, normal range 0-5) and procalcitonin (1.2 ng/dl, normal range 0-0.09). An EKG was normal. A chest and abdomen computed tomography was performed. The exam showed a central PE and a sub-total thrombotic occlusion of the right renal artery, with several hypo-perfused areas in the homolateral kidney (Figure 1 and 2).

No atherosclerotic plaques in the main arteries were noted. Anticoagulation with therapeutic doses of subcutaneous enoxaparin was started. For the suspicion of a paradoxical embolism a trans-thoracic echo-contrast echocardiogram was obtained, and the exam documented a PFO with right-to-left shunt (Figure.3).

Magnetic resonance imaging (MRI) of the brain and venous compression ultrasonography (CUS) of

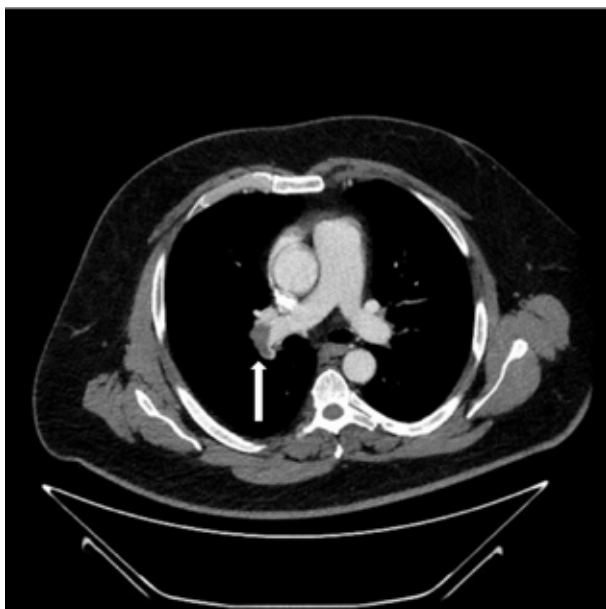


Figure 1. Embolus of the right upper lobar pulmonary artery (arrow).



Figure 2. Right renal artery thrombosis (upper arrow) with hypo-perfused areas of the kidney (lower arrow).

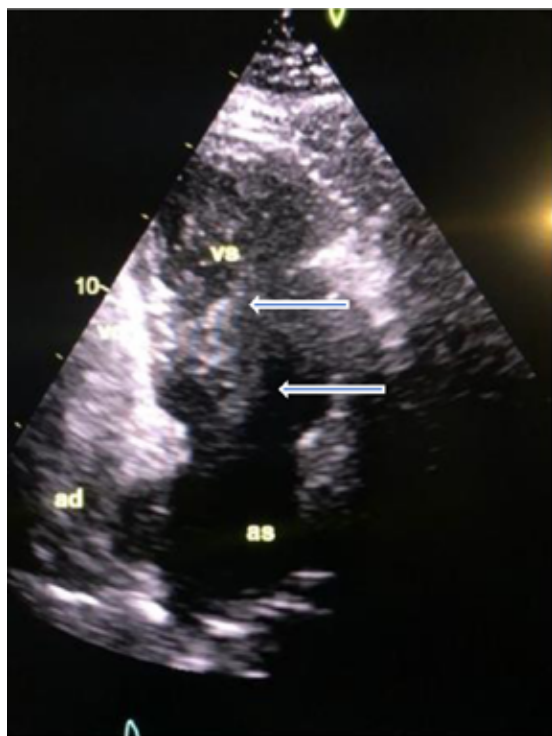


Figure 3. Contrast echocardiography: contrast material in the left ventricle (arrows) as a consequence of right to left atrial shunt.

vd, right ventricle; **ad**, right atrium; **as**, left atrium; **vs**, left ventricle.

the lower extremities were normal. The conditions of the patient progressively improved, and he was discharged eight days after the admission with long-term prescription of oral apixaban. No attempt to closure of PFO was made. At the time of this report, after three months of follow-up, he is going well.

Discussion

Foramen ovale is a fetal inter-atrial communication that usually closes soon after birth. Although in about 20-30% of the population this closure is incomplete (1,2), the higher pressure in the left atrium usually prevent the migration of potential venous thrombi. However, if the right atrium pressure exceed that of the left atrium, paradoxical embolism can occur (2). This pathogenic mechanism could explain our case. Indeed a thrombus from the venous system could have caused PE and could have increased the pulmonary artery and right atrium pressures, which in turn could have allowed a subsequent thrombus to migrate in the right renal artery through the PFO. Admittedly no thrombi were found in the veins of the lower extremities with the CUS. However this exam is abnormal only in a

minority of cases of PE (5), albeit most emboli originate from the veins of the lower limbs (6). We believe our case is interesting for two main reasons. First, the isolated occlusion of one renal artery is very rare in paradoxical embolism, which usually affects the circulation of the brain or extremities (1-4). Of note, MRI of the brain was normal in our case. Second, the diagnosis of pulmonary embolism was delayed by about one month due to its atypical manifestation. The classical clinical features of pulmonary embolism are indeed acute onset of dyspnea, chest pain, syncope or hemoptysis (6). However, isolated exertional dyspnea has occasionally been reported among the clinical manifestations of PE (7). The optimal treatment of paradoxical embolism depends on the clinical presentation. When an acute venous thromboembolism co-exists, the cornerstone of the therapy of is full-dose anticoagulation (2,4), while the utility of PFO closure remains controversial (4). If a cryptogenetic stroke had occurred in a patient with PFO, closure of the foramen ovale plus anti-platelet therapy has shown to be superior to anti-platelet therapy alone (8-10), and anticoagulation seems to be better than antiplatelet therapy (11). There are no randomized trials evaluating the usefulness of PFO closure in the case of unexplained systemic embolism. However, closure would seem to be reasonable in selected cases (12).

Conclusion

Pulmonary embolism and isolated thrombotic occlusion of one renal artery is a rare manifestation of paradoxical embolism. The exertional dyspnea is an atypical manifestation of PE and can delay the diagnosis. The optimal treatment of paradoxical embolism depends on the clinical presentation.

Ethics approval and informed consent: Ethic approval: not applicable. Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity

interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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