

Case Report

Mesenteric Ischemia Revealing a Patent Foramen Ovale (PFO): Case Report and Literature Review

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Abstract: Digestive ischemia is rare among all acute ischemias. It is even rarer when its origin is a paradoxical embolism. Paradoxical embolism is an important clinical entity in patients with venous thromboembolism and the presence of cardiac or pulmonary shunts. The clinical manifestations are serious but diverse and sometimes make the diagnosis difficult. The advent of transesophageal ultrasound (TEE) has greatly facilitated the detection of patent foramen ovale (PFO). Given the diagnostic and therapeutic interest of this apparently rare manifestation, we report the observation of a young patient aged 20, with the initials AB, recently delivered one month, admitted to the surgical emergency department of the national hospital of Niamey (HNN) for diffuse abdominal pain. The clinical evaluation allowed the diagnosis of acute generalized peritonitis. The anesthesiological evaluation classified her as ASA 1 U. In the operating room, after rapid sequence induction followed by orotracheal intubation, opening the abdominal cavity allowed the aspiration of approximately 300 cc of peritoneal fluid and the discovery of a mesenteric infarction involving the loops from 10 cm from the ileocecal junction to 90 cm from the ileocecal junction. Elsewhere, the exploration was unremarkable. The procedure performed was a segmental resection, end-to-end small intestine anastomosis and the patient was transferred to the continuing care services for continued care. Given this atypical picture, hypotheses were raised as part of an etiological search. Thus, we thought of a paradoxical embolism given the notion of recent childbirth, which is a risk factor for venous thromboembolic disease, and familial dyslipidemia. The lipid profile was normal but cardiac Doppler ultrasound revealed a 4mm diameter interatrial communication with right-to-left shunt (PFO). The final diagnosis was that of a paradoxical embolism through a patent foramen ovale leading to mesenteric ischemia. The outcome was favorable under antiplatelet therapy.

Keywords: Mesenteric ischemia, patent foramen ovale, paradoxical embolism, Niamey, Niger.

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INTRODUCTION

Digestive ischemia is rare among all acute ischemias. They are all the more so since their origin is a paradoxical embolism. Paradoxical embolism is an important clinical entity in patients with venous thromboembolism and the presence of cardiac or pulmonary shunts. The clinical manifestations are serious but diverse and sometimes make diagnosis difficult. The advent of TEE has greatly facilitated the detection of PFO, the most important mediator of paradoxical embolism [1]. Although the severity and complications of paradoxical embolism are recognized,

this pathological entity is still rarely diagnosed and remains under-reported. Given the diagnostic and therapeutic interest of this apparently rare manifestation, we report the observation of a young patient, without cardiovascular risk factors, one month old, admitted to the continuing care department for postoperative management of mesenteric ischemia.

CASE CLINIC

20-year-old patient with the initials AB, with a history of one month of vaginal delivery, admitted to the surgical emergency department of the Niamey National

Hospital (HNN) for diffuse abdominal pain in whom, after a clinical assessment, the diagnosis of acute generalized peritonitis was made. The anesthesiological assessment allowed her to be classified ASA 1 U, because apart from the picture of abdominal pain, the rest of the clinical examination and the paraclinical assessments at the time of diagnosis were unremarkable. In the operating room, after rapid sequence induction followed by orotracheal intubation, opening of the abdominal cavity allowed the aspiration of approximately 300 cc of peritoneal fluid and the discovery of a mesenteric infarction taking the loops from 10 cm from the ileocecal junction to 90 cm from the ileocecal junction. Elsewhere, the exploration was unremarkable. The procedure performed was a segmental resection of the affected loops, an end-to-end small intestine anastomosis. The patient was transferred to the continuing care department for continued care. Given this atypical picture of mesenteric infarction in this young 20-year-old patient with no known

pathological history apart from a notion of delivery by the vaginal route for a month and without cardiovascular risk factors, hypotheses were raised as part of an etiological search: A paradoxical embolism given the notion of recent delivery which is a risk factor for venous thromboembolic disease and familial dyslipidemia. The lipid profile performed was normal but the cardiac Doppler ultrasound revealed a 4mm diameter interatrial communication with a right-to-left shunt (PFO) (**Figure 1**). The assessment was completed by an ultrasound of the supra-aortic trunks and a venous Doppler of the pelvic limbs which had returned normal. The final diagnosis was that of a paradoxical embolism through a patent foramen ovale leading to mesenteric ischemia. The management consisted of putting her on antiplatelet drugs (aspirin) 100 mg per day. The evolution was favorable and the patient was discharged with follow-up in cardiology and cardiac surgery for closure of the communication.

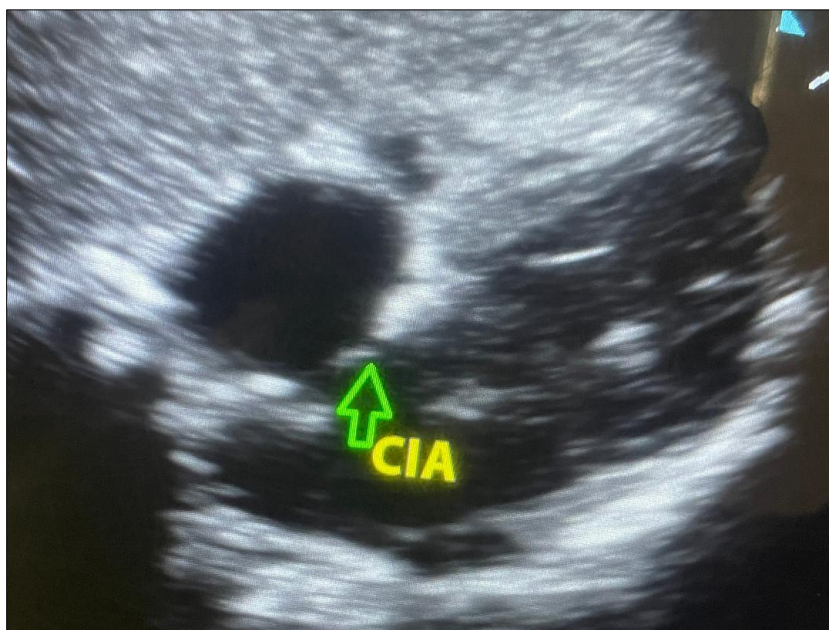


Figure 1: Cardiac Doppler ultrasound showing the PFO

DISCUSSION

This mesenteric ischemia in this young patient without cardiovascular risk factors occurring in a postpartum context with a normal lipid profile, a normal supra-aortic trunk ultrasound and a PFO discovered during echocardiography allowed the diagnosis of paradoxical embolism through the PFO. Paradoxical embolism is a common clinical entity in patients with venous thromboembolism in the presence of intracardiac or pulmonary shunts. The diagnosis of paradoxical embolism on patent foramen ovale is rare, because since its first description by Nellesen *et al.*, in 1985, 48 cases have been reported in the literature [2]. It is difficult to establish and requires at least two of the following items [1]:

- Deep vein thrombosis or pulmonary embolism (or both)
- A right-to-left shunt with or without intracardiac thrombus
- An arterial embolism without emboligenic left heart disease.

In our case, our patient presented two of three criteria. Indeed, in a meta-analysis reporting 43 cases of paradoxical embolism, only 40% presented all three criteria [3]. The association of the three criteria is therefore not essential to evoke the diagnosis. The search for deep venous thrombosis of the two lower limbs was negative in our patient. This result is consistent with the data in the literature which found 20 to 30% of patients with proven pulmonary embolism with normal bilateral

phlebography due to the formation of a transient thrombus or technical insensitivity. However, the inability to document deep venous thrombosis does not exclude a paradoxical embolism, because an embolus of one mm in diameter, undetectable by conventional diagnostic techniques, is sufficient to cause an arterial thromboembolic accident [4, 5]. The clinical presentation of paradoxical embolism is diverse and potentially fatal. Although the severity and complications are recognized, this pathological entity is still rarely taken into account and remains underreported [6]. During embryonic life, the foramen ovale allows the passage of oxygenated blood from the right heart to the left heart. It could be described as a window formed by the partial fusion of the septum primum and secundum. This fusion is complete by the age of two years in 75% of individuals. No causal factor has been identified to date, but familial and genetic factors could play a role. The prevalence and size of this foramen (from 1 to 19 mm, on average 4.9 mm) are similar in men and women. Most patients with a PFO are asymptomatic [7]. The patent foramen ovale (PFO) remains in 25% of adults and is frequently associated with atrial septal aneurysms [6]. Although the majority of patients are asymptomatic, different clinical manifestations are possible. The patient could present a paradoxical embolism as well as a cryptogenic stroke, mesenteric ischemia as in our patient or even a myocardial infarction [6]. Arterial embolisms are more frequent in the cerebrovascular territories than in the periphery [8, 9]. One study reported the case of emboli in the digestive arteries as is also the case for our patient [1]. According to Goldhaber [10], patients with pulmonary embolism with paradoxical embolisms have nine times more risk of excess mortality than other pulmonary embolisms. A link between migraine and patent foramen ovale has also been established by the various studies. Although systematic screening for PFO in migraine patients is not recommended, PFO closure has been suggested as a treatment for migraine [11]. The patient could also be the victim of an air embolism, especially in the context of a decompression accident. This occurs in particular during scuba diving. The passage of an air embolus through a defect in the atrial septum was first described in a diver in 1986 [6]. Different techniques can detect a right-to-left shunt associated with a PFO: TEE, intracardiac ultrasound (ICE), and cardiac MRI. The latter technique is rarely used given its cost and lack of availability. TEE is now considered the 'gold standard' examination for reaching a diagnosis and is usually performed after intravenous injection of saline contrast medium in which cavitation has been previously induced. This is called the microbubble test: it allows visualization of the arrival of microbubbles in the left atrium, attesting to an interatrial communication. The test is positive if more than 5 bubbles are quickly visible in the left atrium. In order to increase this shunt, the patient may be asked to cough or perform a Valsalva maneuver (which will increase venous return to the right heart by raising intra-abdominal pressure) [6]. Unlike TTE, TEE allows

diagnosis in all cases, and also provides a pre-interventional anatomical view of the foramen ovale. It also allows diagnosis of other anomalies often associated with PFO, such as an interatrial septal aneurysm, a Chiari network, an atrial septal defect and Ebstein's anomaly (tricuspid atresia) [7]. However, caution is advised when treating PFO in a patient who has had an ischemic event, since PFO is not always the cause. Given the high prevalence of PFO in the general population, it is possible that it is only a bystander and that other mechanisms are responsible.

CONCLUSION

Paradoxical embolism is an important clinical entity in patients with venous thromboembolism and the presence of cardiac or pulmonary shunts. The clinical manifestations are serious but diverse and sometimes make the diagnosis difficult. The advent of TEE has greatly facilitated the detection of PFO but echocardiography still has its place as in our patient.

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