Case report

Acute limb ischemia as a complication of an early infectious endocarditis after an atrial septal defect patch closure

ABSTRACT

We report the case of a 47 years-old female who presented to the emergency department with acute pain and coldness in the left lower limb 5 months after surgical closure of atrial septal defects. Initial examination was consistent with a clinical presentation of acute limb ischemia. Doppler ultrasonography and Computed Tomography angiography of the lower extremity arteries confirmed the presence of an occlusion on the left popliteal artery. Echocardiography assessment revealed the presence of vegetation of the surgical atrial septal defect closing patch and blood culture were positive for staphylococcus aureus. The patient was treated by antibiotics for 6 weeks and underwent a surgical patch closure replacement. Screening for endocarditis in patients with systemic embolism and a history of atrial septal defect patch closure is mandatory even though endocarditis is a rare complication. Therapeutic approach in case of systemic emboli and large vegetation often requires surgical removal and replacement of the closure patch.

KEYWORDS

Early infectious endocarditis, antibiotic prophylaxis, atrial septal defects, Surgical patch closure

ABBREVIATIONS

ASD: Atrial septal defect

CHD: congenital heart disease

CT: Computed Tomography

CRP: C-reactive protein

ESC: European society of cardiology

PCT: Procalcitonin

TEE: Transesophageal echocardiography

TTE: Transthoracic echocardiography

WBC: Wight blood cell count

1. INTRODUCTION

Infective endocarditis is a relatively rare complication associated with a significant morbidity and mortality (1). Atrial septal defects (ASD) represent the second most frequent CHD (after ventricular septal defects). with a worldwide reported birth prevalence of 2.62 per 1,000 live births (2). Ostium secundum ASD are predominant (80%) and eligible for catheter closure when the left-to-right shunt is

significant, depending on the size of atrial septal rims (3). Whereas in patients with Ostium primum ASD, or with Ostimum secundum ASD not eligible for percutaneous closure, surgical patch closure is indicated. If prosthetic infective endocarditis after ASD transcatheter closure is extremely rare (4), it is even more rare after surgical patch closure. To our knowledge this is the first case of early endocarditis on surgical patch closure of ASD.

We report an extremely rare case of early infective endocarditis that occurred in an 47-year-old female patient, 5 months after cardiac surgery.

2. CASE PRESENTATION

- Patient demographics and history of illness

We report the case of a 47 years-old female who, following symptoms of dyspnea, was diagnosed with ostium primum ASD responsible for right ventricular dilation and significant pulmonary hypertension without other cardiac abnormalities. She underwent a surgical closure of ASD with a patch on August 2020. She presented to the emergency department on January 2020 (5 months after cardiac surgery) with acute pain and coldness in her left lower limb.

- Physical examination findings

At initial physical examination, the patient had stable hemodynamic and respiratory state, her blood pressure was 100/60 mmHg, room air oxygen saturation was 98% and her temperature was 37.8°C. At physical examination, the left lower limb was pale, paresthetic and cold under knee level, it was very painful during passive and active mobilization. pedal and posterior tibial pulses were abolished. These findings were consistent with an acute left limb ischemia.

- Test results and diagnosis

Doppler ultrasonography and Computed Tomography (CT) angiography of the lower extremity arteries confirmed the presence of an occlusion on the left popliteal artery.

The Electrocardiogram showed a regular sinus rhythm at 90 beats per minute, the PR interval was fixe at 160ms, the QRS was 80ms, the ST segment was isoelectic.

Transthoracic echocardiography assessment revealed the presence of two echogenic irregular formations with vibratory movement on both sides of the surgical atrial septal defect closing patch, measuring 13 x 9 mm on the right side and 14 x 13 mm on the left side, without patch dislocation nor interatrial shunts and without other valvular damages. Left ventricular systolic and diastolic function were normal and right ventricular systolic function was normal.

Blood tests showed elevated inflammatory markors. The C-reactive protein (CRP) was 264 mg/L, Procalcitonin (PCT) was 3.2 ng/ml, white blood cell count (WBC) was 20310 /mm3. Blood cultures were positive for a Penicillin susceptible staphylococcus aureus in two separated blood specimens.

Tomographic assessment including brain CT and bodyscan did not reveal any deep infectious location or any other embolic complication.

This results were consistent with an early infective endocarditis of surgical ASD patch closure complicated with systemic embolization in the left popliteal artery responsible for an acute limb ischemia.

- Treatement

The patient underwent urgent embolectomy using a Fogarty catheter and heparin therapy, she was treated by intravenous antibiotics for 6 weeks with Gentamicin (2 weeks, 3 mg/kg/day) and Ceftriaxon (6 weeks, 2 g/day) and underwent a surgical patch closure replacement after 2 weeks of intravenous antibiotics. The bacteriological study of the removed patch did not find any germs (probably sterilization by antibiotic therapy). Dental care was performed (simple dental caries treatment) in order to prevent endocarditis recurrence.

- Outcome

After embolectomy by fogarty catheter, the left lower limb regained normal coloration and sensation, with disappearance of pain. Under antibiotic therapy, the patient was afebrile, didn't present any other embolic event with an improvement in inflammatory parameters (decrease in CRP and hyperleukocytosis). Surgical replacement of the closure patch was performed on day 15 of antibiotic therapy without any postoperative complications.

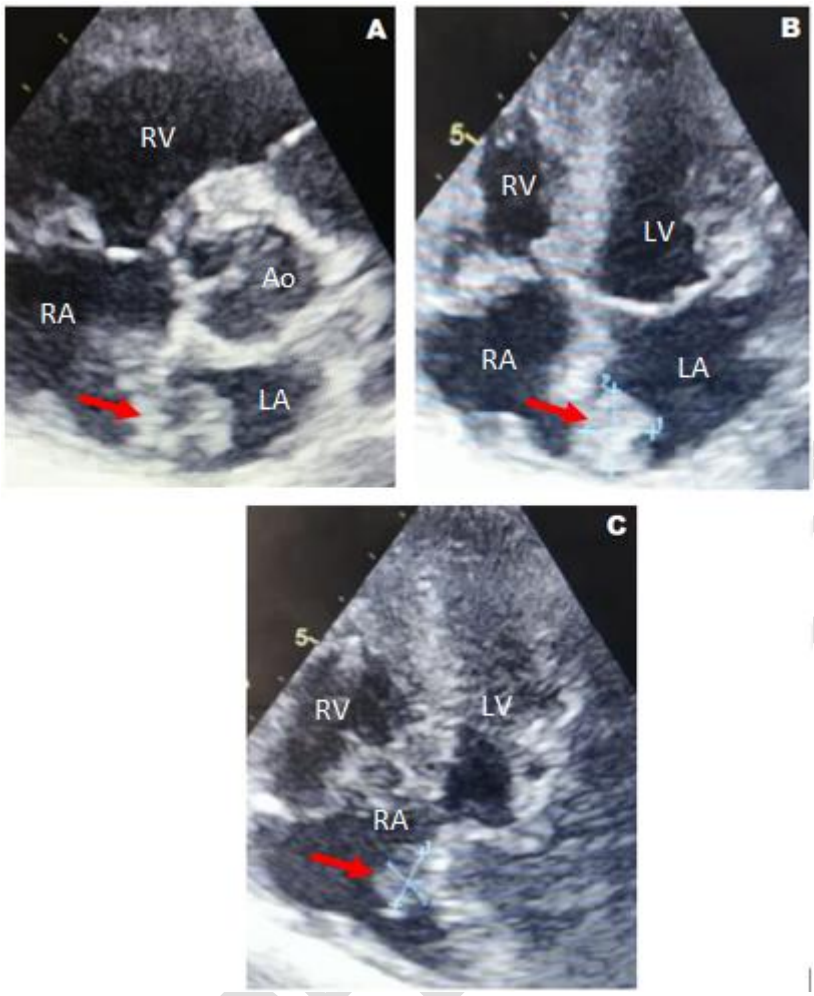

Figure 1: Transthoracic echocardiography (A) Basal parasternal short axis view (B) Apical 4 chamber view (C) Right ventricular apical view : showing two formations on both sides of the surgical atrial septal defect closing patch.
*RV: right ventricle; LV: left ventricle; RA : right atrium; LA: left atrium; Ao: Aorta
*Red labels indicate the vegetations

3. DISCUSSION

Infective endocarditis is commonly considered to be an exceptional event following percutaneous ASD device closure and it is very exceptional after surgical patch closure (5). Most reported cases in literature relates to endocarditis after percutaneous device closure of ASD. To our knowledge this is the second case of infective endocarditis of surgical patch of ASD and the first case reporting an early endocarditis on surgical patch of ASD.

Infective endocarditis after ASD correction can have various clinical presentations including persistent fever, impaired general condition, chest pain, systemic emboli, petechiae, and septic shock. Diagnosis is made by transesophageal echocardiography (TEE) and positive blood cultures in most cases, sometimes by transthoracic echocardiography (TTE). *Staphylococus aureus* is found in most cases. Other reported microorganisms are streptococcus, *Bacillus pumilus*, and *Klebsiella pneumonia*. Negative blood cultures can be observed (4). Management of infective endocarditis after ASD device

consists of intravenous antibiotics for at least 6 weeks. Surgical removal of the device is usually necessary after 2-3 weeks of antibiotics in cases with systemic embolization, big size or growing vegetation, non-controlled infection, abscess, or in other case surgery must be performed urgently in complicated cases with cardiogenic shock or refractory heart failure. The search for an infectious entry point, in particular dental is essential.

Mechanisms of infection after ASD closure procedure are unclear (6). Screening for signs of infection before cardiac surgery is recommended and thus postponing ASD closure when the patient presents with any recent clinical symptoms of infection. In reported cases of infective endocarditis after ASD closure, some invasive procedures were performed shortly after ASD occlusion, suggesting bacteremia following the procedure. The risk for infective endocarditis might have therefore been underestimated (7). Some authors suggested that infection might have occurred before the end of neo-endothelialization, with seeding of microorganisms after the procedure, and development of thrombus and bacteremia (8),(9).
Reported cases of infective endocarditis might therefore challenge the duration of endocarditis prophylaxis after ASD closure. Recent guidelines on prevention, diagnosis, and treatment of infective endocarditis have restrained antibiotic prophylaxis and reinforced nonspecific hygiene measures, recommending good oral hygiene and regular dental care to reduce the risk of infection (4)(10) (11) . However, in a recent survey, more than half of the cardiologists do not follow the American Heart Association 2007 guidelines in their practice (12). The European society of cardiology (ESC) 2015 guidelines for the management of endocarditis kept the same antibiotic prophylaxis (13). Therefore, counseling for optimal oral health in patients at risk of infective endocarditis needs to be improved in current practice.

For congenital heart disease (CHD) patients, antibiotic prophylaxis before dental procedure is now recommended in five situations: prosthetic valve, previous infective endocarditis, unrepaired cyanotic CHD (including palliative shunts and conduits), completely repaired congenital heart defect with prosthetic material or device (whether placed using surgery or catheter intervention, during the first 6 months after the procedure), and repaired CHD with residual defects at the site or adjacent to the site of a prosthetic patch or prosthetic device (4),(10), (13).

4. CONCLUSION

Even though infective endocarditis is considered to be an exceptional event following ASD closure, it can be responsible for serious complications including systemic embolism that can compromise the functional or vital prognosis of the patient. Therefore prevention is mandatory, it include antibiotic prophylaxis only for 6 months after ASD closure if no residual shunt,as well as good oral health on life-long basis following ASD patch closure.

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