



Acute Limb Ischemia as a Complication of Early Infectious Endocarditis Following Surgical Closure of an Atrial Septal Defect: Case Analysis and Literature Review

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

Background: This study reports the case of a 47-year-old woman who presented with acute pain and coldness in the left lower limb, occurring 5 months after a surgical closure of an atrial septal defect (ASD). Initial examination suggested acute limb ischemia.

Methods: Doppler ultrasound and computed tomography (CT) angiography of the lower extremity arteries confirmed the presence of an occlusion in the left popliteal artery. Echocardiography revealed vegetation on the surgical patch used for the ASD closure. Blood cultures were positive for *Staphylococcus aureus*.

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Treatment: The patient was treated with antibiotics for 6 weeks and underwent replacement of the surgical patch.

Conclusion: This case underscores the importance of screening for endocarditis in patients with systemic embolism and a history of ASD patch closure, even though endocarditis is a rare complication. In cases of systemic emboli and large vegetations, a therapeutic approach often requires surgical removal and replacement of the closure patch.

Keywords: Infectious endocarditis; acute limb ischemia; atrial septal defect; surgical closure; antibiotic prophylaxis.

1. INTRODUCTION

A congenital heart abnormality can be effectively corrected by surgical closure of an atrial septal defect (ASD).

Conversely, complications such as infected endocarditis may arise. Such infections can result in significant complications, including acute limb ischaemia, despite often manifesting early and presenting with vague symptoms. In addition to examining the clinical and therapeutic features of this issue, this study presents a unique case.

The case concerns a 47-year-old female patient who had surgical closure of an ASD and subsequent severe limb ischaemia. Examinations showed vegetations on the surgical patch and an obstruction in the popliteal artery.

This manuscript addresses a critical and underexplored complication of cardiac surgery: limb ischemia as a result of early infectious endocarditis following the surgical closure of an atrial septal defect.

Its importance lies in shedding light on a rare yet life-threatening condition, which highlights the need for heightened clinical awareness and prompt intervention.

The emphasis on multimodal diagnostic tools and the necessity for immediate pharmacotherapy or surgical intervention offers valuable insights for improving patient outcomes. I appreciate the manuscript for its clinical relevance, as it provides a detailed case analysis and literature review that can help guide future diagnosis and treatment strategies.

2. CASE PRESENTATION

We report the case of a 47-year-old woman with no notable medical history before the procedure. Five months prior, she had undergone surgical

closure of an atrial septal defect (ASD) using a synthetic patch, a procedure aimed at correcting a congenital cardiac malformation. Although the operation proceeded without immediate complications, the patient began to exhibit concerning symptoms post-intervention.

The patient presented in an emergency setting with complaints of acute pain and persistent coldness in the left lower limb. These symptoms were accompanied by marked alteration in the limb's coloration and temperature, suggesting acute ischemia. The urgency of the situation led to immediate admission for evaluation and treatment.

Clinical examination revealed intense localized pain in the left lower limb, associated with notable coldness and pallor. These signs were consistent with acute limb ischemia.

The patient presented with a sensation of fever and dyspnea, more pronounced with exertion, during the initial examination, but the local symptoms were concerning.

To assess the underlying cause of the symptoms, several diagnostic investigations were performed:

- This imaging identified a significant embolic occlusion of the left popliteal artery, likely caused by a thromboembolism, confirming the presence of a blockage in the blood flow to the lower limb.
- Computed Tomography (CT) Angiography: CT angiography provided additional evidence of the arterial occlusion, allowing for a more precise evaluation of the extent and location of the blockage.
- Echocardiography: Echocardiography revealed vegetations on the right side of the surgical patch used for ASD closure.

These vegetations were suspected to be the source of the infection and associated complications.

- Blood Cultures: Blood cultures isolated *Staphylococcus aureus*, a pathogen known to cause severe infections. This bacteriological confirmation supported the diagnosis of infectious endocarditis.

In response to this complex situation, a multidimensional treatment approach was implemented:

- Antibiotic Therapy: The patient was placed on a targeted antibiotic regimen of ciprofloxacin and gentamicin for six weeks. The choice of antibiotics was guided by the sensitivity of the isolated bacteria, aiming to effectively eradicate the infection. The surgical intervention was only performed after cultures turned negative, ensuring the infection was fully controlled before proceeding.
- Surgical Intervention: Surgical intervention was necessary to replace the infected synthetic ASD closure patch. This procedure aimed to remove the infectious vegetations and correct the underlying issue to restore the functional integrity of the atrial septum and prevent future complications.

Following these interventions, the patient showed signs of clinical improvement. Pain and coldness in the lower limb gradually diminished, and blood circulation was restored. A rigorous follow-up was planned to monitor the progression of the infection and ensure the complete recovery of the patient.

3. DISCUSSION

Surgical closure of an atrial septal defect (ASD) is a common and generally well-tolerated procedure aimed at correcting a congenital cardiac malformation. However, as demonstrated by the case we reported, rare but severe complications, such as infectious endocarditis, can occur. This discussion explores the nature of these complications, their management, and implications for clinical practice.

Infectious endocarditis is a rare but potentially severe complication following ASD closure. According to recent literature, this complication typically occurs within the first few months post-

procedure, aligning with the timing of symptom onset in our patient [1]. Vegetations on the closure patch can serve as a source of infection, facilitating clot formation and systemic emboli. A 2023 meta-analysis highlighted that while the incidence of infectious endocarditis post-ASD repair remains low, specific patient characteristics, such as age and comorbidities, can influence the risk of developing this complication [2].

Staphylococcus aureus is a common pathogen in cases of infectious endocarditis following ASD closure, as indicated by our blood culture results [3]. This microorganism is particularly virulent and can cause severe infections, making early treatment crucial. The clinical manifestations of infectious endocarditis can vary widely. In our case, acute limb ischemia was the primary manifestation, resulting from an occlusion of the popliteal artery. This presentation is unusual and emphasizes the diverse possible manifestations of infectious endocarditis [4]. Symptoms of acute pain and limb coldness can often lead to misdiagnoses or delayed diagnosis, highlighting the need for thorough clinical examination and a high index of suspicion in patients with a history of cardiac surgery.

Echocardiography plays a vital role in diagnosing infectious endocarditis, allowing for visualization of vegetations on prosthetic devices [5]. Recent advancements, such as three-dimensional echocardiography, enhance the ability to visualize vegetations and contribute to better treatment planning. A 2024 study demonstrated that these advanced imaging techniques not only aid in early detection but also improve surgical outcomes by providing detailed anatomical information [6]. The use of additional imaging techniques, such as CT angiography, further helps evaluate the extent of embolism and plan treatment.

Management of infectious endocarditis following ASD closure requires a combined approach. Prolonged antibiotic therapy is essential for eradicating the infection. Antibiotics should be selected based on the sensitivity of the isolated bacteria, as outlined in current recommendations for treating *Staphylococcus aureus* [7]. A recent guideline update in 2024 recommends tailoring antibiotic therapy to combat resistant strains, emphasizing the need for effective treatment strategies [8]. Simultaneously, surgical

intervention to replace the infected patch may be necessary to address issues related to vegetations and prevent recurrence. This step is crucial to avoid severe complications, such as recurrent systemic emboli.

This case highlights several key points for clinical practice:

Precise and Early Screening: Patients who have undergone ASD closure should be closely monitored for signs of infectious endocarditis, even though this complication is rare. Regular examinations and awareness of embolic symptoms can improve early diagnosis.

Multidisciplinary Approach: Management of these complications often requires collaboration among cardiologists, cardiac surgeons, and infectious disease specialists to ensure appropriate and coordinated treatment.

Prophylaxis and Preparation: While preoperative antibiotic prophylaxis is commonly used to prevent infections, postoperative monitoring remains crucial for detecting early infections and adjusting treatment strategies accordingly.

4. CONCLUSION

This case emphasizes the importance of early screening and treatment of endocarditis following ASD surgical closure. Complications such as acute limb ischemia necessitate a combined therapeutic approach, including adequate antibiotic therapy and, in some cases, surgical revision.

In conclusion, managing infectious endocarditis after ASD closure requires heightened vigilance and an integrated therapeutic approach. The presented case illustrates the challenges associated with these rare complications and the need for rigorous follow-up protocols to optimize clinical outcomes.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

CONSENT

As per international standards or university standards, patient(s) written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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