

EARLY SEPTIC EMBOLI IN A SICKLE CELL PATIENT SECONDARY TO SURGICAL ATRIAL SEPTAL PATCH ENDOCARDITIS: A CASE REPORT

Émbolos sépticos tempranos en un paciente con anemia falciforme secundarias a endocarditis del parche quirúrgico del tabique interauricular: un reporte de caso

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Received: 09/07/2025 • Accepted: 09/07/2025

How to cite: Mateo, T., Romano, R., Cortorreal, R., Rosario, M. (2026). Early septic emboli in a sickle cell patient secondary to surgical atrial septal patch endocarditis: a case report. *Ciencia y Salud*, 10(2), 79-86. <https://doi.org/10.22206/cisa.2026.v10i2.3455>

Abstract

Background: Infective endocarditis (IE) of an atrial septal defect (ASD) surgical patch is rare but life-threatening. Early recognition is crucial, particularly in patients with sickle cell anemia due to increased infection risk. **Case Presentation:** An 18-year-old female with sickle cell disease (SCD) and recent ASD repair presented with fever, hemiparesis, and neurological decline. **Findings:** Imaging revealed cerebral emboli and cardiac thrombus. Transesophageal echocardiography (TEE) identified an infected surgical patch. **Conclusions:** Early postoperative IE should be suspected in febrile patients with repaired congenital heart disease (CHD). Prompt imaging and

Resumen

Antecedentes: La endocarditis infecciosa (EI) de un parche quirúrgico de comunicación interauricular (CIA) es una complicación poco común pero potencialmente mortal. Su reconocimiento temprano es crucial, especialmente en pacientes con anemia falciforme debido al mayor riesgo de infección. **Presentación del caso:** Paciente femenina de 18 años con anemia falciforme y cierre quirúrgico reciente de CIA, se presentó con fiebre, hemiparesia y deterioro neurológico. **Hallazgos:** Las imágenes revelaron émbolos cerebrales y trombo cardíaco. El ETE mostró infección en el parche quirúrgico. **Conclusion:** Se debe sospechar EI postoperatoria temprana en pacientes febriles con cardiopatías congénita reparadas. El diagnóstico oportuno y

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antibiotic therapy are essential to prevent embolic complications.

Keywords: Case reports, endocarditis infective, heart septal defects atria, stroke embolic, surgical procedures operative.

tratamiento antibiótico son fundamentales para prevenir complicaciones embólicas.

Palabras clave: Accidente cerebrovascular embólico, defectos del tabique interatrial, endocarditis, informes de casos, procedimientos quirúrgicos operativos.

Introduction

The incidence of IE in CHD is significantly higher than in the general population, with a cumulative incidence of 8.5% by adulthood^{1, 2}. In patients with sickle cell anemia, the risk of developing complications such as IE and embolic events is exacerbated due to altered hemodynamics and the chronic inflammatory state inherent to the disease. Infections related to intracardiac patches or surgical corrections in CHD are occurring more frequently than previously recognized. Once considered rare, recent cases have underscored their occurrence in both early and late postoperative periods^{1, 3, 4}.

For ASD closure, atrial septal patches have become a standard therapeutic option for symptomatic patients, comparable to surgery in terms of efficacy, with the added benefits of shorter hospital stays and fewer serious complications^{3, 5}. Nevertheless, infectious complications of atrial septal occlusion patches can still occur, albeit in about 0.1% of cases. The risk of surgical patch-associated IE is mainly determined by the timing of the procedure, with the highest risk occurring six months post-surgery². Surgical patch-associated IE is linked with several high-risk complications, such as systemic embolism, acute limb ischemia, or brain abscesses, and contributes to approximately 4% of total mortality in this population^{2, 4, 6}.

Accurate and timely diagnosis is essential. The modified Duke criteria remain the standard framework for diagnosing IE, incorporating clinical,

microbiological, and echocardiographic findings⁷. Among imaging modalities, TEE is the diagnostic tool of choice for detecting valvular or patch-associated endocarditis due to its sensitivity in identifying vegetations or abscesses when compared to transthoracic echocardiography (TTE), particularly in post-surgical patients^{2, 7}.

This case emphasizes the importance of a comprehensive cardiac evaluation in CHD patients presenting with systemic infection, regardless of prior surgical correction^{8, 9}. Given the challenges in detecting and eradicating infectious foci, particularly in high-risk populations with underlying hematologic conditions, early intervention is essential to mitigate potentially devastating outcomes.

Narrative

Clinical history and demographic information

The patient was an 18-year-old female from the Dominican Republic with a medical history of homozygous SCD, ischemic stroke, and an ASD diagnosed at the age of five, which was surgically repaired with an atrial patch three weeks prior to presentation. She presented with left-sided hemiparesis, fever, somnolence, and left eye deviation. Three days before her admission to the emergency department, she experienced acute upper-extremity weakness, impacting her grip strength and motor coordination. As the weakness progressively worsened, she sought medical attention.

Clinical findings

During the physical examination, the patient was lethargic and febrile (38.5 °C), with mild dysarthria. Vital signs were stable except for sinus tachycardia. Neurological examination revealed left-sided hemiparesis (muscle strength: 0/5), hyperreflexia in the lower extremities, and Achilles clonus on the right. National Institutes of Health Stroke Scale (NIHSS) score was 4. Gaze deviation, impaired ocular motility, and nystagmus were suggestive of one-and-a-half syndrome.

Diagnostic assessments

Upon admission, initial workup revealed leukocytosis (WBC: $28.2 \times 10^3/\mu\text{L}$) and moderate anemia (Hgb: 8.3 g/dL, HTC: 25.1%). Based on altered consciousness, partial left hemiparesis, and unexplained fever, meningoenitis was initially suspected. The patient was subsequently admitted to the intensive care unit (ICU) due to recurrent febrile episodes, persistent leukocytosis, and unclear neurological etiologies requiring higher acute care was started. Nonetheless, blood cultures, urinalysis, FilmArray panel, and cerebrospinal fluid analysis were all negative. ECG demonstrated sinus tachycardia with premature ectopic complexes. Head CT on day two revealed right temporal and frontal hypodensities consistent with an acute ischemic lesion.

On the third day of admission, laboratory evaluation indicated persistent leukocytosis and anemia, which remained unchanged from prior evaluation (WBC: $25.2 \times 10^3/\mu\text{L}$, HTC: 22.8%). A cerebral magnetic resonance imaging (MRI) scan corroborated an acute ischemic lesion involving the right frontal lobe, the left thalamus, and the cerebellar vermis. Cardiac embolism was hypothesized due to the involvement of both anterior and posterior circulatory systems. Reduced signal intensity within

the internal carotid artery and its cavernous segment indicated thrombus formation. Thrombosis was suggested in the left posterior cerebral artery (PCA). Additionally, the encephalomalacia signaled chronic vascular damage in the area supplied by the left middle cerebral artery (MCA). Notably, no abnormalities were identified on the carotid Doppler ultrasound examination.

On day 5, TTE demonstrated the absence of embolic events. Conversely, TEE identified an ASD patch accompanied by a mass suggestive of infectious vegetations affixed to the pericardial patch at the interatrial septum, oriented toward the left atrium. Following Duke's criteria, **a diagnosis of surgical patch-associated IE after ASD closure was established, complicated by cerebral septic emboli.** Treatment regimen for IE was initiated with cefepime and vancomycin.

In the concluding days of the ICU admission, the patient exhibited notable neurological improvement: alertness, consciousness, and orientation were observed, alongside an ability to respond to verbal commands. The assessment revealed slight recovery in muscle strength in the previously completely hemiplegic left body. However, due to persistent anemia, she required a blood transfusion. Transcranial Doppler (TCD) reported the patient as being at risk for cerebrovascular events, with a maximum velocity (TAMAX) of 170 cm/s recorded in the left MCA. Vital signs remained stable, and laboratory analyses demonstrated a positive response to the blood transfusion, but still reflecting persistent leukocytosis. The patient was closely monitored for potential complications, and the overall recovery trajectory remained favorable. Consistent therapeutic management strategies were upheld throughout this period. On the seventh day of admission, the patient was transferred from the ICU to the general ward for continued care.

On her first days in the general ward, the patient exhibited a fever of 38.5°C along with the following laboratory findings: with persistent leukocytosis alongside profound ongoing anemia (6.8 g/dL, HCT 20.4%). Furthermore, inflammatory markers demonstrated noteworthy elevations, with C-reactive protein (CRP) measured at 7.24 mg/L, erythrocyte sedimentation rate (ESR) at 74 mm/h. The patient continued to demonstrate restricted adduction of the right eye. However, a significant improvement was noted in neurological function, particularly regarding the left hemiparesis, where muscle strength continued to improve from initial baseline.

Despite some neurological improvements, the clinical trajectory of the patient took a negative turn following two weeks of antibiotic therapy. This deterioration was characterized by persistent fever, ongoing signs of infection, and a sustained inflammatory response. However, blood and urine cultures collected within the following 24 hours demonstrated no microbial growth. Given the patient's clinical course, the infectious disease service maintained antimicrobial therapy. The inflammatory markers reflected a decline in CRP to 5.27 mg/L and a WBC to $12.8 \times 10^3/\mu\text{L}$, contrasted by an elevation in ESR to 130 mm/hr and procalcitonin (PCT) to 0.13 ng/mL, which could have been due to a persistent inflammatory state because of the patient's medical background. A subsequent TEE revealed no visible vegetation. Due to a low score NIHSS stroke, therapeutic DAPT for 21 days with clopidogrel and low-dose aspirin was prescribed. She was also started on SCD therapy with hydroxyurea and folic acid.

The patient's clinical condition showed considerable improvement after 16 days of hospitalization and antibiotic treatment. Patient became afebrile and WBC count returned to normal. The patient maintained a state of alertness, demonstrating con-

sciousness and oriented to person, place, and time, with hemodynamic stability. Physical exam showed near full recovery to left hemibody strength, and the patient was discharged in stable condition.

Outcome

Diagnosis was confirmed based on one major Duke criterion (vegetation on TEE) and three minor criteria (fever 38.5°C, embolic stroke, and CHD). These findings confirmed a definitive diagnosis of **surgical atrial patch IE following ASD closure, complicated by cerebral septic emboli**. After discharge, she completed a 4-week dual antibiotic regimen with trimethoprim-sulfamethoxazole and fluoroquinolone. Follow-up blood cultures were negative. The patient was referred to cardiology, neurology, and rehabilitation services for long-term care.

Discussion

This case presents a highly complex clinical challenge. The early post-surgical culture-negative endocarditis causing a septic embolic stroke is a scenario in which we must first consider the patient's history of SCD. The context of SCD carries a stroke risk on its own, with data suggesting that 11% of SCD patients experience a stroke before the age of 20¹⁰. However, the patient's initial presentation of neurological findings combined with fever indicates a more complex etiology, and this prompts a consideration of the quality of immune function. Although spleen studies were not conducted on the patient during admission, it is well known that SCD results in functional asplenia, which can occur in early infancy. Consequently, there is compromised immune function against encapsulated bacteria¹¹. During the admission, evidence of endocarditis was noted in imaging studies, but the blood cultures returned negative. Given that certain encapsulated bacteria are a significant cause of culture-negative endocarditis and the potential for functional asple-

nia in this patient, we can conclude that a critical risk factor for the patient's condition was the previously compromised immune function and, evidently, the surgical approach to the ASD repair¹².

This case highlights the crucial role of imaging techniques such as TEE. Particularly when initial TTE fails to reveal any vegetation; however, the appropriate clinical decision to perform a TEE resulted in identifying the etiology of the patient's condition and determining the proper therapeutic approach. Previous studies have emphasized the importance of echocardiography in atypical presentations and in cases of culture-negative infective endocarditis. As shown in our patient, TEE demonstrates superior sensitivity compared to TTE for detecting intracardiac vegetations, with a positive predictive value nearing 100%¹³.

Cerebral embolism is the most common neurological complication of bacterial endocarditis, as evidenced in our patient. Stroke incidence following surgical closure of ASDs ranges from 0.57% to 2.9%^{13, 14}. The most effective strategy for reducing cardioembolic risk in patients with ASD involves early diagnosis and timely identification of high-risk individuals. Additionally, antibiotic prophylaxis beyond six months for all patients and antiplatelet therapy are recommended to promote complete patch endothelialization and prevent surgical atrial patch infective endocarditis¹⁴. Careful, long-term follow-up with specialists is crucial for the early detection of residual abnormalities and the development of associated complications^{15, 16}. This proactive approach may help reduce the risk of stroke and systemic embolism, both of which can have devastating consequences.

Conclusion

IE associated with surgical patches should always be considered in patients presenting with fever and cor-

rected CHD. The diagnosis of septic embolization in such cases requires a comprehensive evaluation that encompasses clinical findings, laboratory tests, and multimodal imaging techniques. It is of critical importance of thorough cardiac assessment, particularly in immunocompromised individuals who are at heightened risk for systemic infections. Furthermore, continuous medical follow-up is imperative for the early identification of residual abnormalities and the onset of associated complications.

Funding

This research did not receive external funding.

Author contributions

In accordance with ICMJE criteria, the contributions were as follows: Conceptualization: TM; Design: RR; Data Collection: RC; Analysis: TM, RC, RR; Writing – Original Draft: TM, RR; Writing – review y editing: TM, RR, RC, MR. All authors reviewed the results and approved the final version of the manuscript.

Ethics committee statement

The study was approved by the Institutional Review Board at Center for Diagnostics and Advanced Medicine and Medical Conferences and Telemedicine, CEDIMAT under IRB approval code IRB000149CEI-62, on February 28, 2025.

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Informed consent statement

Informed consent was obtained from the subject involved in the study.

Statement on data availability

The IRB approval granted authorization to access the patient's health information for the purpose of producing this case report. This information is available for review only if deemed necessary and under authorized consensus. However, no personal health information will be disclosed to third parties, in order to ensure the protection and confidentiality of the patient's data.

Conflicts of interest

The authors declare no conflicts of interest.

Abbreviations

Las siguientes abreviaturas fueron utilizadas en el manuscrito:

ASD	Atrial Septal Defect
BID	Twice a day (bis in die)
BUN	Blood Urea Nitrogen
CHD	Congenital Heart Disease
CRP	C-Reactive Protein
CT	Computed Tomography
ECG	Electrocardiogram
ESR	Erythrocyte Sedimentation Rate

Hgb	Hemoglobin
HTC	Hematocrit
ICU	Intensive Care Unit
IE	Infective Endocarditis
IV	Intravenous
LAD	Left Atrial Diameter
LAVI	Left Atrial Volume Index
MCA	Middle Cerebral Artery
MRI	Magnetic Resonance Imaging
NIHSS	National Institutes of Health Stroke Scale
O. d.	Once daily (omni die)
PCA	Posterior Cerebral Artery
PCT	Procalcitonin
QID	Four times a day (quater in die)
SCD	Sickle Cell Disease
TAMAX	Time-Averaged Maximum Velocity
TCD	Transcranial Doppler
TEE	Transesophageal Echocardiography
TID	Three times a day (ter in die)
TTE	Transthoracic Echocardiography
WBC	White Blood Cell Count

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