

Chiari Network and Aortic Valve Endocarditis with Concurrent Pulmonary and Systemic Embolization



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INTRODUCTION

Infective endocarditis occurs in about 13% of febrile injection drug users¹ and involves the right and left heart valves with equal frequency.² Concurrent right-sided and left-sided endocarditis (bilateral endocarditis) has been reported in 9%-13% of intravenous drug users with endocarditis.²⁻⁴ Chiari network or Eustachian valve as the primary focus of right-sided endocarditis, in the absence of tricuspid valve involvement, is rare.^{5,6} We present a case of bilateral infective endocarditis due to *Staphylococcus aureus* in an intravenous drug user with pulmonary and systemic embolization, where the primary right-sided cardiac involvement was a very large vegetation on the Chiari network rather than on the tricuspid valve.

CASE PRESENTATION

A 41-year-old woman with history of intravenous drug use presented with a two-week history of fever and fatigue. Physical examination revealed an erythematous, raised, and painful lesion on the lateral aspect of the left fifth finger, suggestive of an Osler's node (Figure 1A), and multiple small erythematous macular lesions on the sole of the right foot, suspicious for Janeway lesions (Figure 1B). Purpura, splinter hemorrhages, or conjunctival hemorrhages were not present. Cardiopulmonary auscultation was negative for murmurs, but diffuse crackles were audible in bilateral lung fields. The spine was tender to palpation in the lower thoracic and upper lumbar regions. Initial laboratory workup revealed leukocytosis and gram-positive cocci. Electrocardiogram did not reveal any arrhythmias or conduction abnormalities. Chest radiograph showed multifocal pneumonia with a small left-sided pleural effusion (Figure 2A). Empiric therapy with vancomycin, cefepime, and metronidazole was initiated.

Transthoracic echocardiography (TTE) demonstrated a mobile echodensity (2.8 × 0.8 cm) in the right atrium (Figure 3 and Video 1) and moderate tricuspid regurgitation. Transesophageal

echocardiography (TEE) confirmed the presence of a very large, highly mobile echodensity in the right atrium attached to the Chiari network and revealed an additional nodular echodensity (0.6 × 0.4 cm) on the left coronary cusp of the aortic valve (Figure 3D and Video 2) with mild aortic regurgitation. An atrial septal defect or patent foramen ovale was not identified.

Magnetic resonance imaging (MRI) of the thoracic and lumbar spine showed enhancement of the T10, T11, and T12 vertebral bodies suggestive of osteomyelitis and diskitis without evidence of an epidural abscess (Figure 2B). MRI of the brain was negative for focal infectious lesions. Computed tomography (CT) of the chest revealed multiple cavitory lesions with thick walls and parenchymal consolidation in both lungs, suggestive of septic embolization (Figure 2C). CT of abdomen and pelvis showed multiple perfusion defects within both kidneys and a large area of hypoperfusion in the left kidney indicating renal infarcts (Figure 2D).

Blood cultures subsequently grew methicillin-resistant *Staphylococcus aureus* (MRSA). The patient was treated with intravenous vancomycin for 12 weeks and closely followed in the infectious disease, neurosurgery, and cardiology clinics after discharge from the hospital. Treatment course was complicated by *Clostridium difficile* diarrhea that was treated with metronidazole. The Osler's node and Janeway lesions resolved 8-10 weeks into therapy. At approximately 12 weeks of follow-up, TTE showed no evidence of vegetations on the Chiari network or the aortic valve, CT imaging indicated resolution of the lung and kidney lesions, and MRI of the spine to follow thoracic diskitis and osteomyelitis revealed evidence of resolving infection. There was no clinical evidence of recurrence at one year of follow-up.

DISCUSSION

The Chiari network⁷ is a filamentous structure in the right atrium that is found in about 2% of patients undergoing TEE.⁸ This clinically benign structure can be confused with a pedunculated right atrial mass, thrombus, or a flail tricuspid leaflet.⁹ However, as noted in the present case, it may occasionally serve as a nidus of infection.^{5,6}

Right-sided infective endocarditis may spread to the left heart structures through a hematogenous route, which is likely in our patient. This dissemination may be facilitated by the presence of a right-to-left shunt at the intracardiac level (e.g., through patent foramen ovale)¹⁰ or intrapulmonary level (e.g., across pulmonary arteriovenous malformation or fistulae).¹¹

The telltale dermatological features of infective endocarditis include Janeway lesions, Osler's nodes, purpura, splinter hemorrhages, and conjunctival hemorrhages.¹² The cutaneous manifestations are due to embolic or immunologic phenomena and are associated with systemic embolization and predict a higher rate of complications.¹² The incidence of cutaneous manifestations has been reduced due to early diagnosis and prompt treatment of bacteremia.¹² However, these

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Keywords: Chiari network, Infective endocarditis, Janeway lesions, Osler's nodes, Septic emboli

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Figure 1 (A) An erythematous papular lesion on the lateral aspect of the left fifth digit represents an Osler's node. This is generally a round (1-2 cm in diameter), purplish, painful lesion that occurs most commonly on the fingertips or the lateral edges of the fingers, palms, toes, or soles and, histologically, is an area of sterile necrotizing vasculitis of the dermal glomus that is thought to be associated with immune complex deposition. (B) Small erythematous macular lesions on the sole of the right foot represent Janeway lesions. These are painless erythematous/hemorrhagic macular lesions on the palms and soles due to septic embolization to an area causing microabscess formation and thrombosis of small vessels in the area.

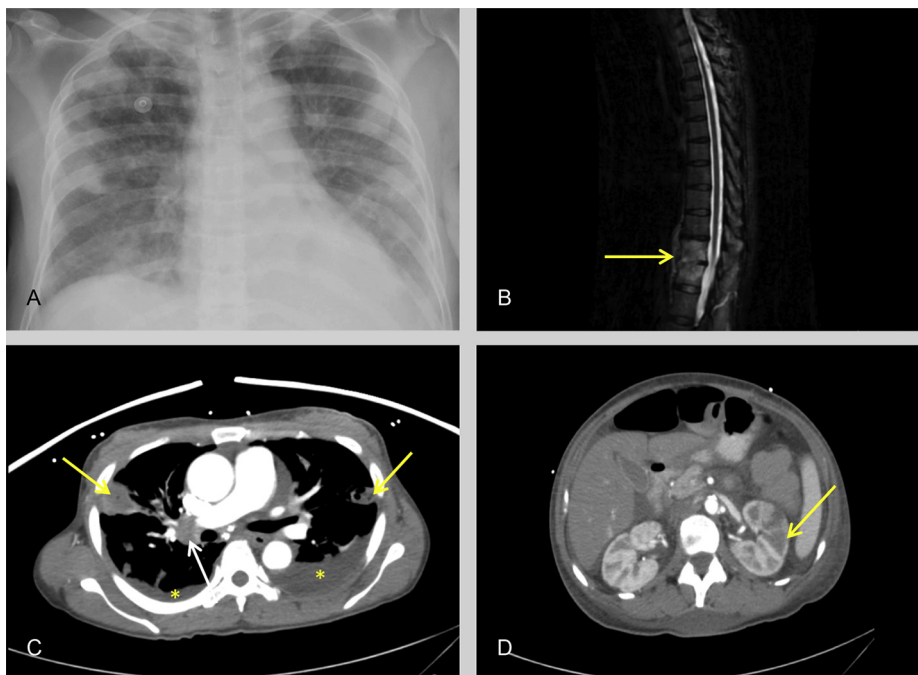


Figure 2 (A) Anteroposterior chest radiograph showing multiple bilateral air space opacities and blunting of the left costophrenic angle. (B) Sagittal magnetic resonance T2 fat saturated image showing hyperintensity in the T11 and T12 vertebral bodies (*yellow arrow*) extending along the anterior aspect with loss of intervertebral disc space. These features are pathognomonic for diskitis or osteomyelitis. (C) Axial CT image of the chest (soft tissue window) with intravenous contrast in the arterial phase shows bilateral pleural effusions (*asterisk*), peripheral rounded opacities (*yellow arrows*) with central necrosis, characteristic for septic emboli, and enlarged right hilar node (*white arrow*). (D) Axial CT image of the abdomen with intravenous contrast in the arterial phase shows a wedge-shaped hypodensity (*yellow arrow*) in the left kidney causing blurring of the corticomedullary junction indicative of an infarct.

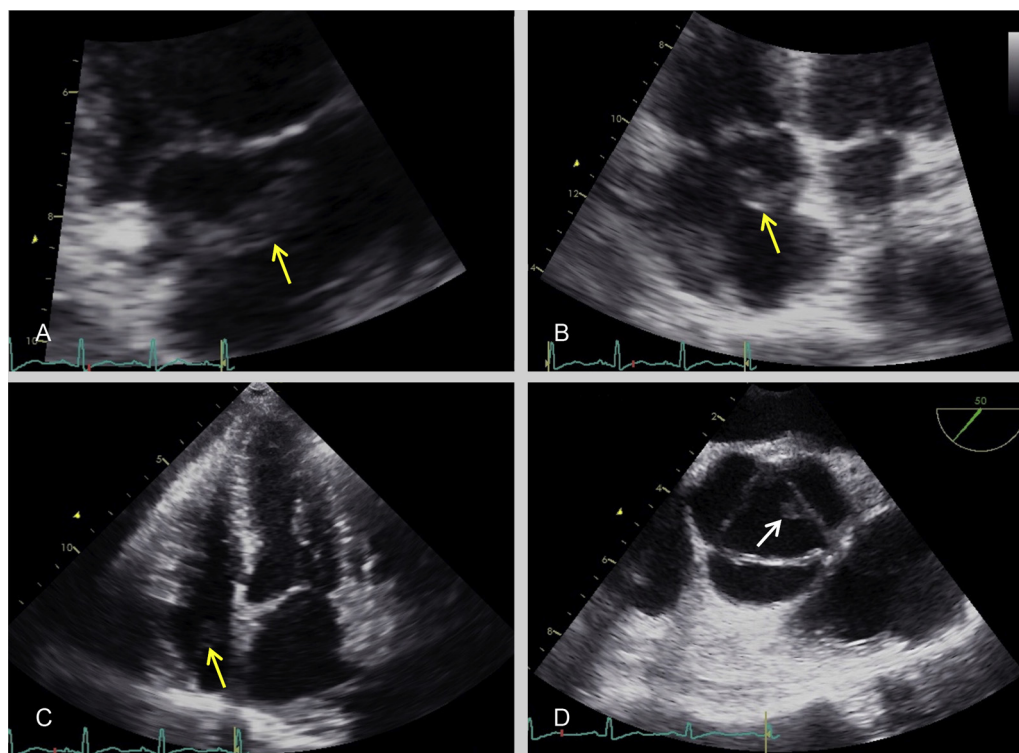


Figure 3 Right atrial echodensity (yellow arrows), measuring 2.8×0.8 cm in size, attached to the Chiari network demonstrated in the right ventricular inflow (A) and four-chamber (B and C) views by TTE. Aortic valve echodensity (white arrow), measuring 0.6×0.4 cm in size, attached to the margin of the left coronary cusp demonstrated on short-axis view (D) by TEE.

findings, if present at initial presentation, as in our patient, can provide important clinical clues to diagnose infective endocarditis.

Treatment of infective endocarditis involves the use of intravenous antibiotics and valve surgery, if indicated.^{13,14} Most cases describing Chiari network endocarditis have reported use of surgery, as this filamentous network predisposes to the risk of persistent infection and thrombus formation.^{5,6} In our case, MRSA bacteremia, vegetations on the Chiari network and aortic valve, and manifestations of pulmonary and systemic embolization resolved with prolonged antibiotic therapy.

CONCLUSIONS

In an injection drug user presenting with fever the prompt recognition of cutaneous signs (Janeway lesions and Osler's nodes) by simple visual inspection and expeditious demonstration of vegetations (on Chiari network and aortic valves) by echocardiography were fundamental in the rapid diagnosis of bilateral endocarditis. The ensuing diagnostic approach established the presence of methicillin-resistant staphylococcal endocarditis with septic emboli in both pulmonary and systemic end organs. Despite a very large vegetation (>2 cm in length) on the Chiari network that usually warrants early surgical removal, appropriate antimicrobial therapy alone resulted in complete resolution of all infectious manifestations with no residual sequelae.

SUPPLEMENTARY DATA

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.case.2017.01.007>.

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