Large Cystic Intracardiac Mass Overlying Left Atrial Appendage Occlusion Device: A Case Report and Literature Review

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INTRODUCTION

The total prevalence of atrial fibrillation (AF) in the United States exceeded 3 million in 2009, with a projected prevalence for 2050 of 7.56 million.[1] The left atrial appendage (LAA) is the most common location for left heart thrombus in 57% of patients with rheumatic AF and 91% of nonrheumatic AF.[2] Evolving LAA occlusion devices provide an alternative to systemic anticoagulation.[3] An example of a percutaneous LAA occlusion device, the Watchman device (Boston Scientific, Marlborough, MA) is a self-expanding nickel-titanium device with fixation barbs, covered by a permeable polyester fabric and delivered under echocardiographic guidance.[4] The Watchman FLX is the newest generation of LAA closure devices. This device has a self-expanding nitinol frame structure with fixation anchors and a permeable polyester fabric cover facing the LAA. The proximal face is flat with a reduced, minimal area of metal screw facing the left atrium to encourage endothelialization and reduce post-implant thrombus formation.[5]

Immediate complications of Watchman implantation include serious pericardial effusion (2.2%-4.1%), device embolization (0.6%), and procedure-related stroke (0.3%).[6] Device-related thrombosis is an overall uncommon complication, mostly occurring between 90 and 365 days with an overall incidence of 3.8%.[7] A prior case presented a patient who developed Enterococcus and Enterobacter bacteremia 13 weeks after Watchman placement. Transesophageal echocardiography (TEE) showed extensive vegetation on the Watchman device, which was treated surgically.[8] Here, we present a case report of a patient who underwent LAA occlusion with a Watchman FLX device, with subsequent development of *Staphylococcus aureus* bacteremia due to a lower extremity wound.

CASE PRESENTATION

A 70-year-old man presented to the emergency department with symptoms of malaise, fatigue, and an unwitnessed mechanical fall 10 days after implantation of a 31 mm Watchman FLX at an outside cardiac center. He reported acute on chronic right foot pain localized to the great toe. Physical examination revealed an erythematous plaque on the right lower leg extending to the medial malleolus with yellowish hemorrhagic crust as well as chronic stasis changes. Additionally, there was ulceration of the right distal hallux of the great toe.

His medical history is significant for persistent AF, pancytopenia due to cryptogenic liver cirrhosis, recurrent urologic bleeding due to hemorrhagic cystitis, and type 2 diabetes mellitus, which was previously complicated by a chronic ulcer in the medial part of his right lower extremity and on his right great toe. Wound culture at that time grew both *Pseudomonas aeruginosa* and methicillin-resistant *Staphylococcus aureus* (MRSA). He completed 6 weeks of antibiotics therapy with daptomycin and cefepime.

Due to recurrent episodes of hematuria, he previously underwent implantation of a Watchman device. Prior to the procedure, he showed no signs concerning for infection; however, he did have an extensive wound on the right lower extremity. Blood cultures were not collected prior to device placement. Vancomycin was administered per routine prior to the procedure. The procedure was performed under general anesthesia with TEE guidance. The device was well-seated in the ostium of the appendage, with acceptable compression of 25%. No leak was detected by color Doppler on TEE. Following implantation of the Watchman FLX, he was started on anticoagulation with warfarin with a targeted therapeutic international normalized ratio (INR) goal between 2.0 and 3.0 for 45 days, to be followed by dual antiplatelet therapy to complete 6 months of treatment, per guidelines recommendations.[4]

Given his current presentation of fatigue, the differential diagnoses were broad. Due to his immunocompromised state with leukopenia, diabetes mellitus, liver cirrhosis, and nonhealing leg wound, there was a high suspicion for an infectious etiology. The most likely sources of infection were the chronic wounds of the right lower extremity. Decompensated liver cirrhosis was considered; however, it was unlikely due to the lack of asterixis, variceal bleeding, and ascites.

Initial laboratory work showed acute on chronic kidney injury, stable pancytopenia (hemoglobin 8.1 g/dL, platelet 36 k/uL), mild elevation of creatine phosphokinase of 3,000 units/L, and INR of 1.7 on warfarin (subtherapeutic). The electrocardiogram showed AF with a left bundle branch block. Head computed tomography was performed due to thrombocytopenia and history of fall, and it was negative for intracranial bleeding. An x-ray of the foot showed blurring of bone borders of the great toe and bone destruction with high suspicion of osteomyelitis. Given his acute kidney injury, magnetic resonance imaging was not performed to confirm the likely osteomyelitis diagnosis. On the next day of admission, blood cultures returned positive for MRSA. Transthoracic echocardiography showed preserved left ventricular ejection fraction and no evidence of valvular vegetation.

Transesophageal echocardiography was performed to further evaluate the Watchman device and cardiac valves for evidence of infection. The TEE revealed a properly positioned Watchman device at the orifice of the LAA. There was a 3 × 2 cm well-organized echodensity with echolucent rim surrounding an echodense center adherent

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VIDEO HIGHLIGHTS

Video 1: Midesophageal TEE clip showing Watchman FLX device with large echogenic mass at initial diagnosis (orthogonal view at 0° and 90°).

Video 2: Midesophageal TEE clip showing Watchman FLX device with large echogenic mass at initial diagnosis (orthogonal view at 45° and 135°).

Video 3: Midesophageal with full-volume three-dimensional TEE clip revealing properly positioned Watchman FLX device at the orifice of the LAA. A well-organized echodensity with echolucent rim surrounding an echodense center adherent to the surface of the device can be seen (45°).

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to the surface of the device (Figures 1-3, Videos 1-3). The differential diagnoses for this mass include thrombus overlying the device, infected thrombus, and vegetation/abscess formation. Due to the large cystic appearance of the mass, the potential organisms involved include a typical bacterial organism, such as MRSA, with abscess formation as well as fungal or other atypical organisms. In the context of having fever and MRSA bacteremia following a new device implantation, a slightly subtherapeutic INR at the time of admission, and the presence of the less thrombogenic Watchman FLX device, this mass most likely represents a large device-related infection versus infected thrombus.

On initial presentation, broad-spectrum antibiotics were initiated. These medications were tailored to intravenous ceftaroline 600 mg every 8 hours and daptomycin 6 mL/kg once daily. Due to high suspicion that the source of MRSA bacteremia was the right great toe, he underwent surgical amputation of the toe without complication. Culture from the wound of his right foot confirmed the growth of MRSA. Due to the subtherapeutic INR, he was started on an intravenous heparin infusion until INR reached a therapeutic level. The cardiothoracic surgery team evaluated the patient for device extraction, but he was deemed a poor surgical candidate due to liver disease, thrombocytopenia, and prohibitive risk score. The patient plans to continue antibiotics and warfarin dosing to maintain therapeutic INR until he returns to the cardiac center where the Watchman device was implanted. There will be a multidisciplinary discussion regarding surgical removal of the device and adherent mass.

DISCUSSION

Complications of LAA occlusion devices are generally rare.[6,7] There are very limited reported cases of LAA occlusion device-related infection or vegetation in the literature. Jensen *et al*[8] described a prior case of a patient who developed Enterococcus and Enterobacter bacteremia 13 weeks after Watchman placement. Transesophageal echocardiography showed multilobulated echogenic mass adherent to the Watchman device. He underwent surgical removal of the infected Watchman.

Following LAA occlusion with the Watchman device, it takes approximately 45 days for the device to have full endothelialization.[4] Thus, it is recommended to continue full anticoagulation with warfarin for 45 days following implantation. On 45-day follow-up, it is recommended to repeat a TEE to evaluate for device position, residual or new paradevice leak, thrombus, and the presence of a residual shunt.[4,9] Following a satisfactory evaluation, therapeutic

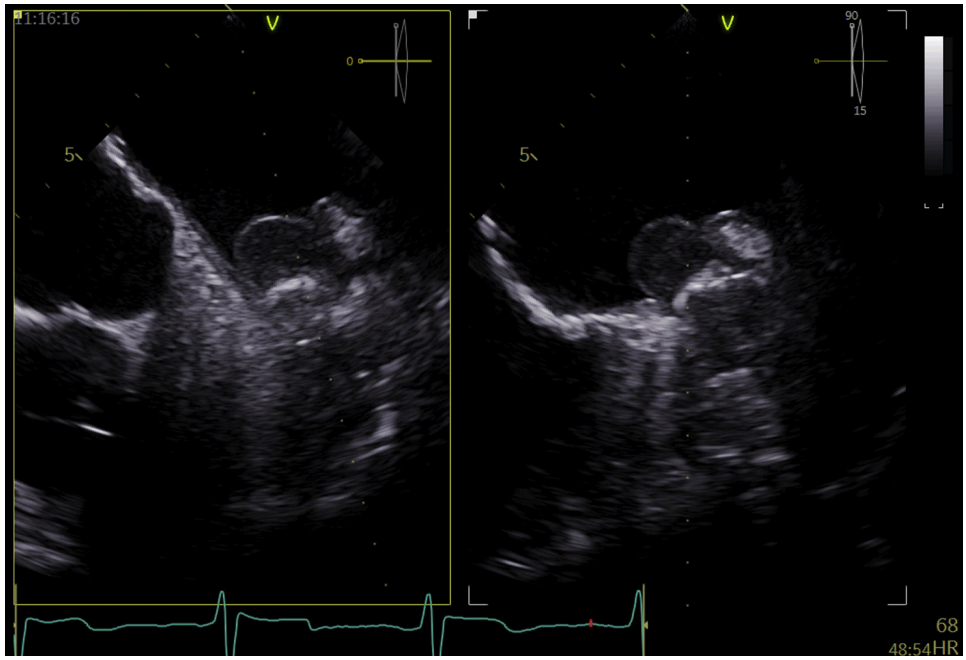

Figure 1 Midesophageal TEE image of Watchman FLX device with large echogenic mass at initial diagnosis (orthogonal view at 0° and 90°).

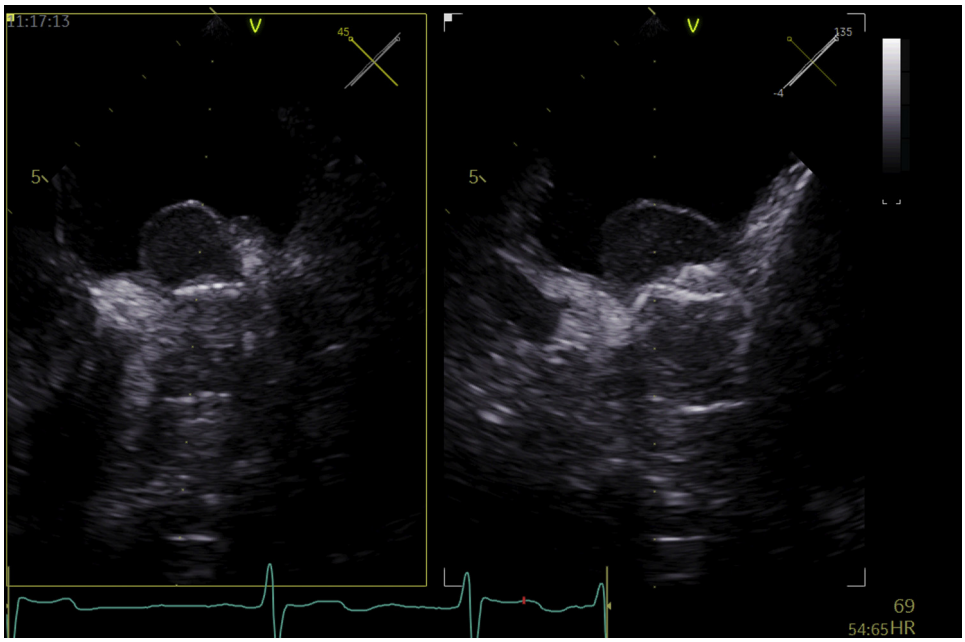

Figure 2 Midesophageal TEE image of Watchman FLX device with large echogenic mass at initial diagnosis (orthogonal view at 45° and 135°).

anticoagulation is changed to dual antiplatelet therapy to complete a 6-month course of medical therapy, prior to indefinite daily aspirin.[6]

Currently, there are no established guidelines regarding infective endocarditis prophylaxis following LAA device implantation. The presence of a cardiac device (including LAA occlusion devices) or prosthetic valve increases the risk of infective endocarditis.[10] Our patient developed bacteremia and likely device- related infection shortly after implantation, although he experienced no symptoms of concern for infection at the time of implantation. This case illustrates a dreaded potential complication for LAA occlusion device placement. This, fortunately rare, complication does not necessarily raise concern for the need for prophylactic antibiotics until full endothelialization is achieved. However, this case illustrates the importance of patient screening and selection, as very early device-related infection is likely

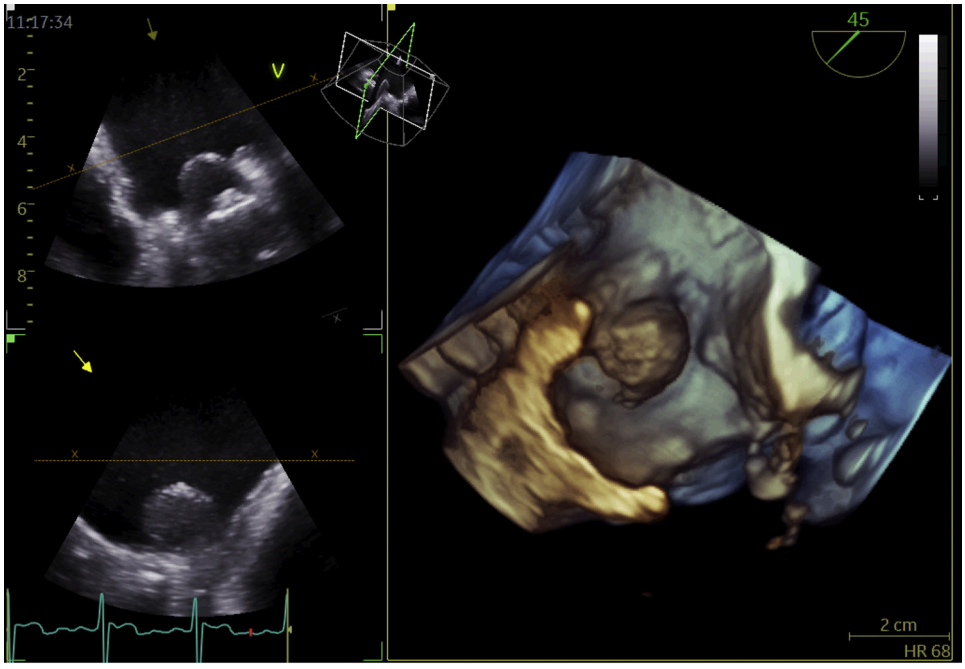

Figure 3 Midesophageal with full-volume three-dimensional TEE image, revealing properly positioned Watchman device at the orifice of the LAA. A well-organized echodensity with echolucent rim surrounding an echodense center adherent to the surface of the device can be seen (45°).

due to peri-implantation bacteremia or procedure-related sterilization processes.

CONCLUSION

Infection of LAA closure devices is an extremely rare entity. Having a high index of suspicion for device-related infection is imperative, especially in the setting of persistent bacteremia refractory to standard antibiotic therapy. Given the lack of guidelines and recommendations in treating LAA occlusion device infection, it is crucial to treat such an infection with a multidisciplinary team approach to ensure better outcomes and long-term survival.

SUPPLEMENTARY DATA

Supplementary data to this article can be found online at https://doi.org/10.1016/j.case.2020.11.006.

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