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IMAGING VIGNETTE

ADVANCED

CLINICAL VIGNETTE

Failure of Complete Endothelialization of a Watchman Device 3 Years Post-Implantation

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ABSTRACT

We report an unusual case of incomplete endothelialization of the Watchman device >3 years after its implantation. Animal data suggest that device endothelialization occurs ~45 days post-implantation; however, data on humans are lacking. Guidelines on anticoagulation are based on expectation from animal studies. (**Level of Difficulty: Advanced.**) (J Am Coll Cardiol Case Rep 2021;3:319–21) © 2021 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

A 57-year-old woman with sickle cell disease, moderate mitral regurgitation (MR), and paroxysmal atrial fibrillation had a CHA_2DS_2-VASc score of 4 and a HAS-BLED score of 3. She had a Watchman device (Boston Scientific Corporation, Marlborough, Massachusetts) implanted due to embolic stroke with hemorrhagic conversion and transfusion-dependent anemia. She was on warfarin and aspirin for 45 days, followed by aspirin and clopidogrel for 4.5 months, and aspirin thereafter. Transesophageal echocardiograms (TEEs) performed at 2, 6, and 12 months showed a well-seated Watchman device with no evidence of thrombus or peri-device leak (**Figure 1A**). After 16 months, she had an ablation of atrial fibrillation, and post-procedure TEE showed no complication from the ablation procedure. Unfortunately, her MR progressed over time (**Figures 1B to 1C**), and she underwent elective mitral valve replacement (MVR) at 37 months after Watchman implantation. At that time, her vital signs and laboratory findings were normal apart from a low hemoglobin level of 6.3 mg/dl requiring blood transfusion. TEE during the MVR showed a well-seated Watchman device without peri-device leak or thrombus (Video 1), but we noted it had not been completely endothelialized (**Figures 1D to 1E**). The Watchman device was left intact, and she was on aspirin and warfarin for 3 months, and continued aspirin daily thereafter. She experienced no cerebrovascular accident or thromboembolic events since these procedures.

When evaluating the Watchman device, it is important to note that TEE imaging has limitations, mainly that it can evaluate thrombus formation and peri-device leak but is not able to evaluate device endothelialization. The use of contrast-enhanced cardiac computed tomography scanning and cardiac endoscopic visualization has been reported to evaluate device endothelialization, but sufficient data are not available to use it broadly in clinical settings. The endothelialization of the Watchman device membrane cap is a complex process (1), and destruction at any stage of this process can cause incomplete endothelialization. Although the diagnosis of

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ABBREVIATIONS AND ACRONYMS

MR = mitral regurgitation

MVR = mitral valve replacement

TEE = transesophageal echocardiogram

endothelialization is made at the microscopic level, in the current patient we noted the Watchman device did not have adequate tissue layering, with a translucent appearance, strongly suggesting incomplete endothelialization. There are a few reported cases of delayed endothelialization in patients with hypercoagulable state or MR with eccentrically directed jet. It has been previously described that MR might be protective against thromboembolic events, possibly due to a "washing machine effect," especially when the left atrium is enlarged (2); however, further data showed no statistically significant correlation (3). It is worth noting that the direction of the MR jet may play a crucial role, and the latter study did not take this in account. The current patient had moderate MR before device implantation, and the MR jet remained eccentrically directed at the time of MVR (Video 2). Our patient also has sickle cell disease, which is considered to be a hypercoagulable state with impaired activation of platelet and coagulation cascade; this also might have played a role.

In conclusion, patients with left atrial occlusion devices with moderate to severe MR should be evaluated carefully with consideration for alternative imaging techniques such as contrast-enhanced computed tomography scan or consideration for longer duration oral anticoagulation.

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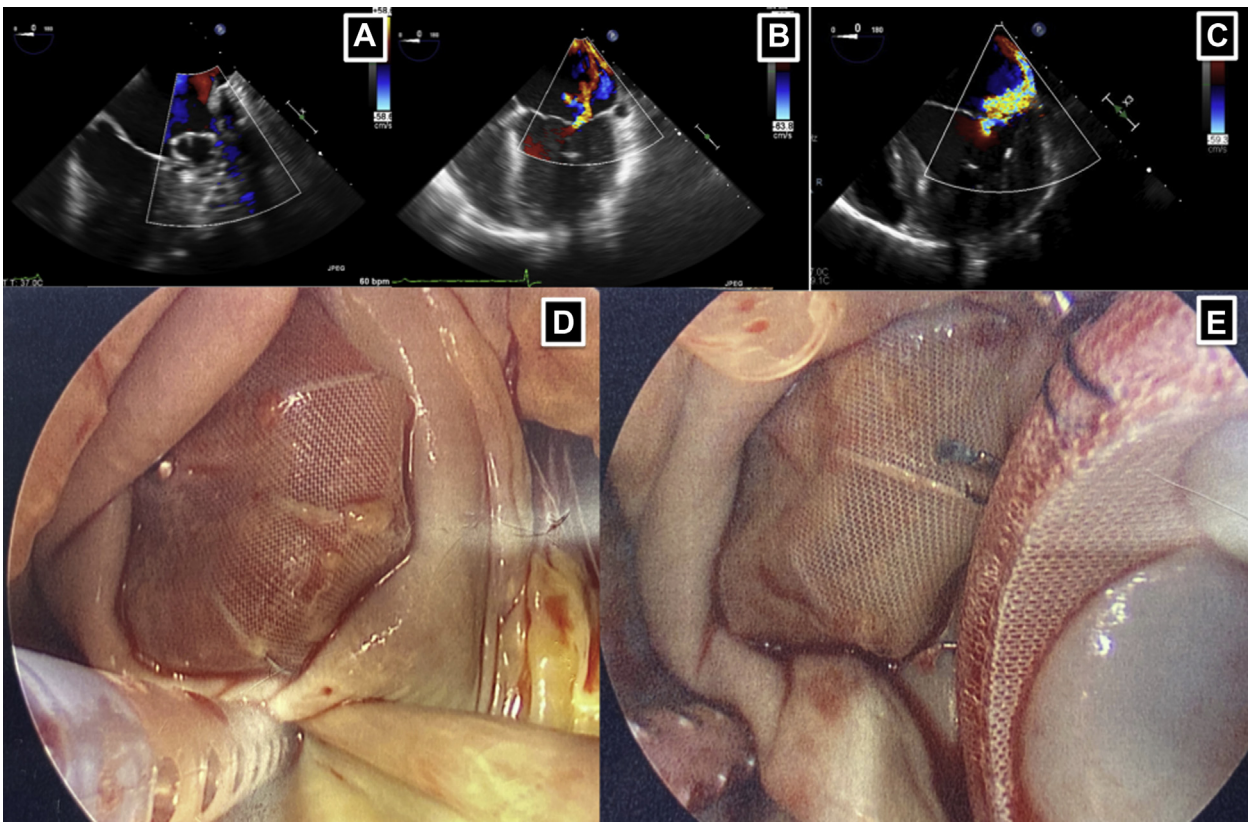
FIGURE 1 Transesophageal Echocardiogram and Intraoperative Image of the Watchman Device



(A) Post-Watchman device implantation transesophageal echocardiogram (TEE) at 12 months showing a well-seated Watchman device without any peri-device leak or thrombus. **(B)** Pre-Watchman device implantation TEE showing a moderate mitral regurgitation with eccentrically directed jet. **(C)** Pre-mitral valve replacement TEE showing a severe mitral regurgitation with eccentrically directed jet. **(D and E)** A failure of complete endothelialization of the Watchman device at 37 months' post-implantation.

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KEY WORDS atrial fibrillation, endothelialization, incomplete endothelialization, left atrial appendage occlusion device, membrane healing, Watchman device

APPENDIX For supplemental videos, please see the online version of this paper.