

# Left Atrial Appendage Closure with Double Watchman Devices: A Case Report

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## Abstract

**The risk of cardioembolic stroke is high in patients with atrial fibrillation. Antiplatelet agents, vitamin K antagonists, and new oral anticoagulants (NOACs) are effectively used to reduce the risk of thromboembolism in high-risk patients. However, increased risks of life-threatening bleeding and narrow therapeutic indexes result in inadequate utilization of these therapies. There is growing practice and evidences in favor of closing the left atrial appendage (LAA) percutaneously by using different devices in patients with either contraindicated or difficult anticoagulation. We report a rare case of a 75-year-old man with atrial fibrillation, high thromboembolic risk (CHADSVASc score of 4), and high bleeding risk score (HASBLED score of 4). He underwent LAA closure using 2 LAA percutaneous closure devices (Watchman) due to bilobed LAA. Considering the great variability in shape and size of the LAA, a single device may not always cover the whole ostium, which leads to residual leaks that can cause a nidus for thrombus formation. Although it technically sounds feasible, a few challenges are associated with double-device implantation. Sealing of the bilobed LAA is technically possible, especially with favorable anatomy, which includes totally separated bodies of both lobes with adequate body sizes.**

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## Key Words

**Atrial fibrillation • Left atrial appendage closure • WATCHMAN device • Anticoagulation**

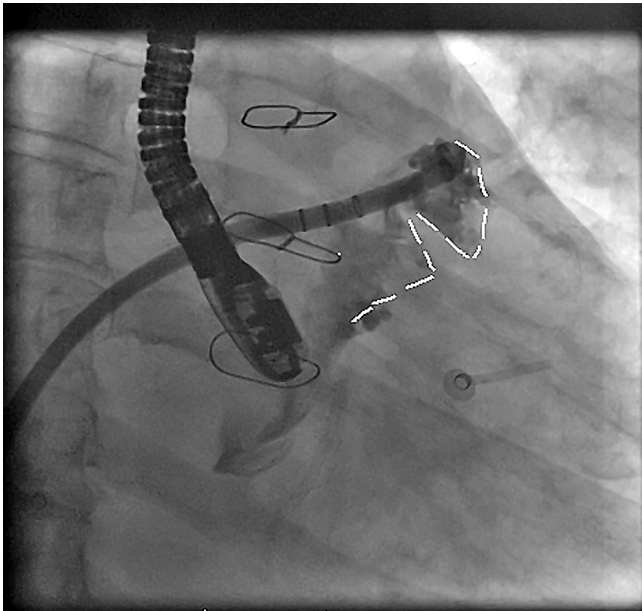
## Introduction

Prevention of cardioembolic stroke is one of the key goals in the treatment of patients with atrial fibrillation (AF). The risk of embolic stroke with nonvalvular AF is 5.6 times higher [1]. Anticoagulants such as vitamin K antagonists (VKA) and new oral anticoagulants (NOACs) are used effectively to reduce the risk of thromboembolism [2]. However, increased risks of mortality, bleeding, and narrow therapeutic indexes result in inadequate utilization of these therapies. There is growing practice and evidence in favor of closing the left atrial (LA) appendage (LAA) percutaneously by using different devices in patients with either contraindicated or difficult anticoagulation. Considering the great variability in the shape of the LAA, sometimes, a single device may not cover the whole ostium, which leads to residual leaks that can cause a nidus for thrombus formation. A previous report on double-device LAA closure using an Amplatzer cardiac plug (ACP) showed favorable results at follow-up [3]. We report a rare case of a 75-year-old man with AF and high thromboembolic risk who underwent LAA closure using double Watchman devices.

## Case Summary

A 75-year-old man who had diabetes, hypertension, hypothyroidism, a post-coronary artery bypass grafting 32 years before, chronic kidney disease (glo-





**Figure 1.** On contrast injection (RAO 20°, CAU 18°) showing bilobed LAA morphology with very wide ostium.

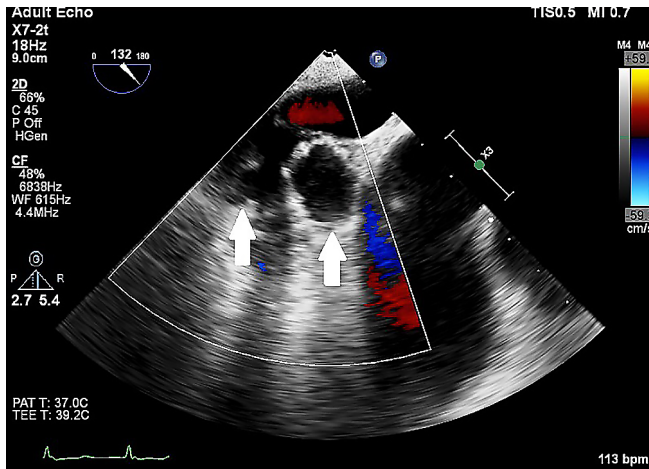


**Video 1.** On contrast injection (RAO 20°, CAU 18°) showing bilobed LAA morphology with very wide ostium. View supplemental video at <https://doi.org/10.12945/jshd.2019.010.18.sup.01>.

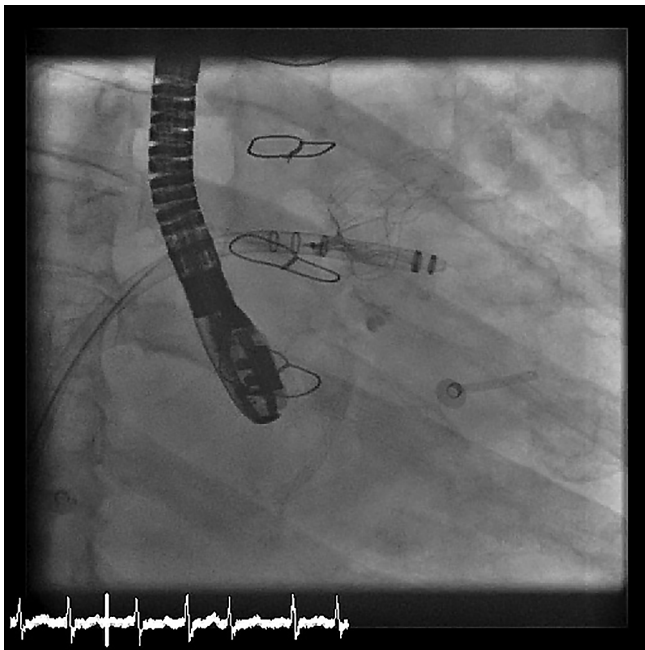
merular filtration rate = 48 mL/min) with an ejection fraction of approximately 40% underwent a permanent AF (CHADSVASc and HASBLED scores of 4). He underwent anticoagulation using rivaroxaban 15 mg.

He was undergoing follow-up as an outpatient because of chronic anemia and heart failure symptoms, and was admitted at our hospital with lower gastrointestinal (GI) bleeding and decompensated heart failure. The patient was hemodynamically stable and had bilateral crepitation at the bases of the lungs along with mild pedal edema on physical examination. His hemoglobin level was 8.4 g/dL and serum creatinine was 193  $\mu\text{mol/L}$ . Colonoscopy revealed two colonic polyps. Considering difficult anticoagulation due to the persistent anemia and lower GI bleeding, he was referred for LAA device closure.

Echocardiography documented a severely dilated LA (indexed LA volume, 63 mL/m<sup>2</sup>). Pre-procedural transesophageal echocardiography revealed a LAA ostial diameter of 20 mm with a depth of 27 mm. The procedure was performed under general anesthesia. A right femoral venous access was used after the transeptal LA puncture pressure was measured. A double curved Watchman access sheath was positioned in the LAA over a pigtail catheter. On contrast injection (RAO 20, CAU 18), a bilobed LAA morphology with very wide ostium was observed (Figure 1, Video 1). After multiple measurements, implantation of two devices was planned as a single device was thought to be inadequate to cover the whole ostium. By using a 14-F Watchman delivery system, a 33-mm Watchman device (Atritech Inc., Boston Scientific, Plymouth, MA) was selected and implanted successfully in the anterior lobe. The device was released after confirming the stability by using a tug test. Both angiography and echocardiography revealed a significantly sized lobe posteriorly (Figures 2 and 3, Videos 2 and 3), which was sealed using a 21-mm Watchman device (Kissing Watchman) by using the same delivery system (Videos 4 and 5). Residual peri-device leaks were excluded, and the stability of both devices was assessed (Figures 4 and 5). The patient was extubated and transferred to the critical care unit for recovery. He was discharged afterward with clopidogrel 75 mg daily and an adjusted dose of warfarin. He underwent follow-up transesophageal echocardiography (TEE) after 6 weeks of the procedure, which showed well-seated watchman devices with trivial peri-device leakage (Video 6). No other complications were observed. The patient was advised to discontinue anticoagulation.



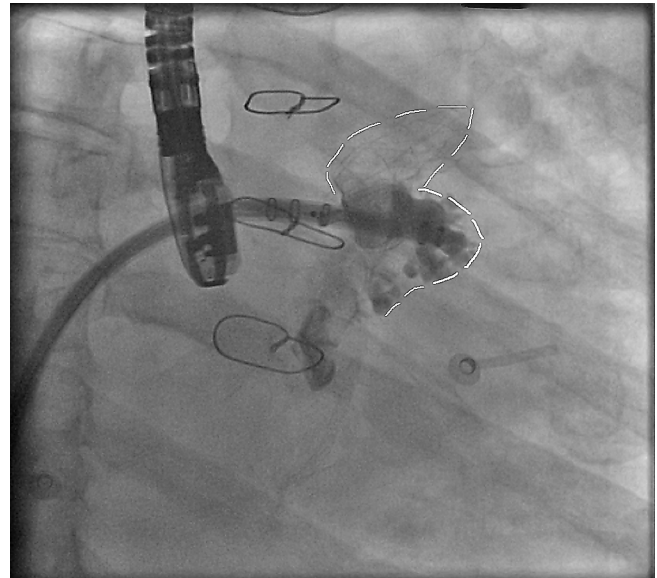
**Figure 2.** TEE image at 132 degrees with color showing implanted WATCHMAN device in anterior lobe with significant gap and flow posteriorly.



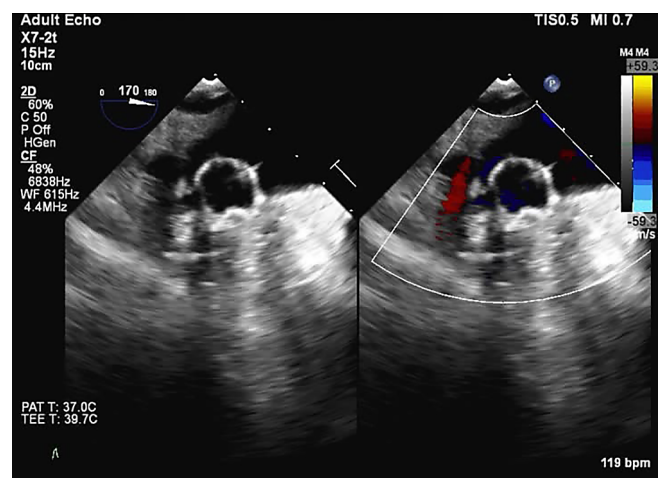
**Video 2.** Contrast injection after implantation of WATCHMAN device anteriorly showed posterior lobe with good size ostium. View supplemental video at <https://doi.org/10.12945/j.jshd.2019.010.18.sup.02>.

## Discussion

AF is one of the most common cardiac arrhythmias (1–2% in Western countries) [4]. More than 15% of cerebral ischemia cases are related to AF [5]. Almost 90% of atrial thrombi are formed in the LAA in patients with nonvalvular AF [6]. Systemic antico-



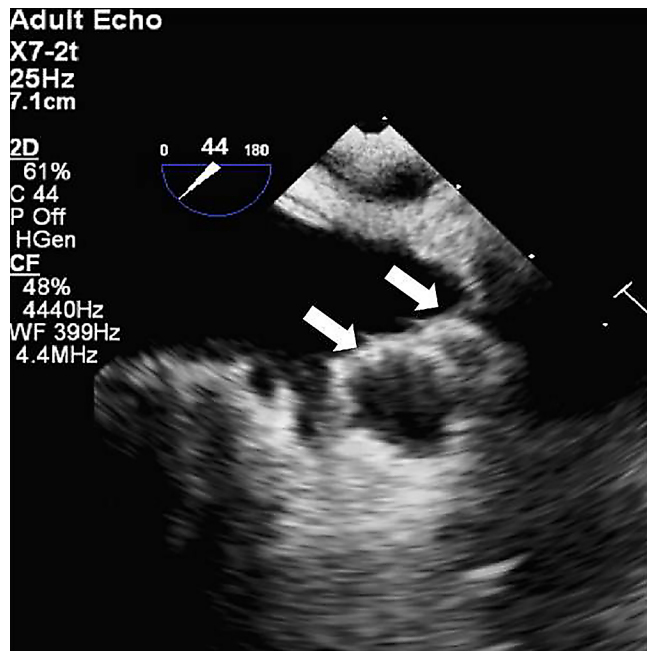
**Figure 3.** Contrast injection after implantation of WATCHMAN device anteriorly showed posterior lobe with good size ostium.



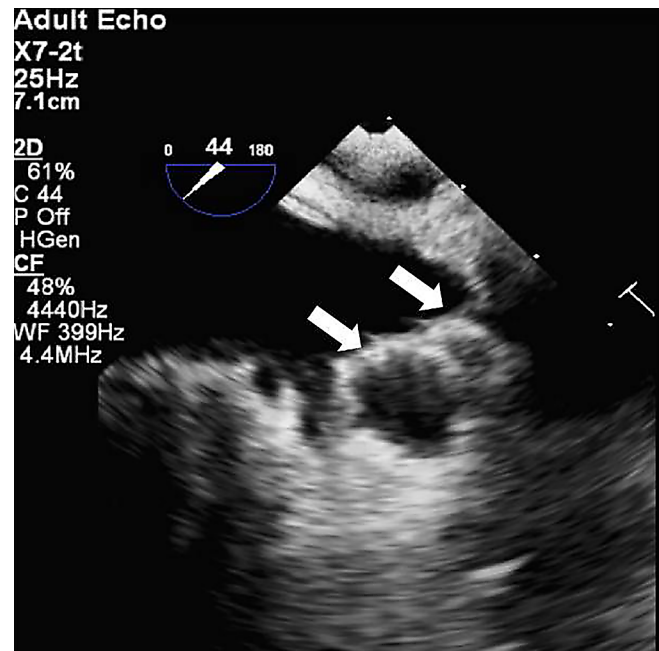
**Video 3.** TEE image at 170 degrees with color showing implanted WATCHMAN device in anterior lobe with significant gap and flow posteriorly. View supplemental video at <https://doi.org/10.12945/j.jshd.2019.010.18.sup.03>.

agulation is the therapy of choice to reduce the risk of thromboembolism in AF, but studies have shown that only few patients receive such therapies despite being indicated for multiple reasons, including complications and noncompliance [7]. Considering these limitations, percutaneous closure of the LAA is becoming increasingly popular in selected patients.

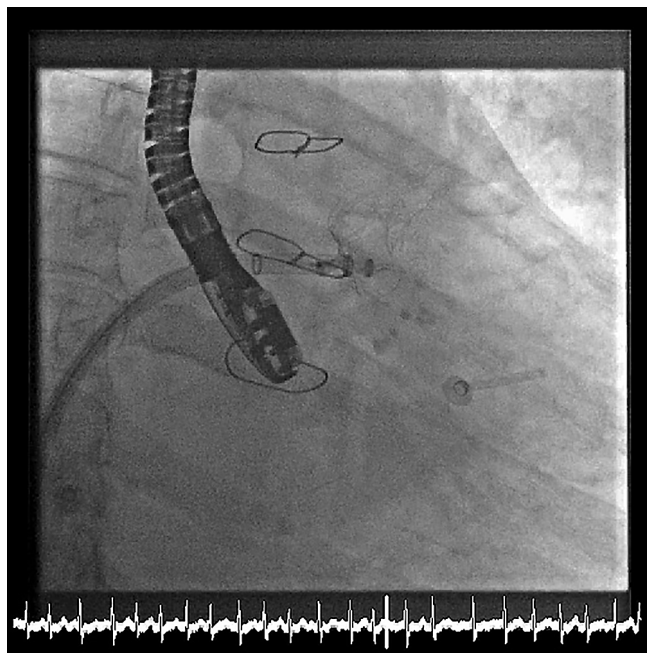




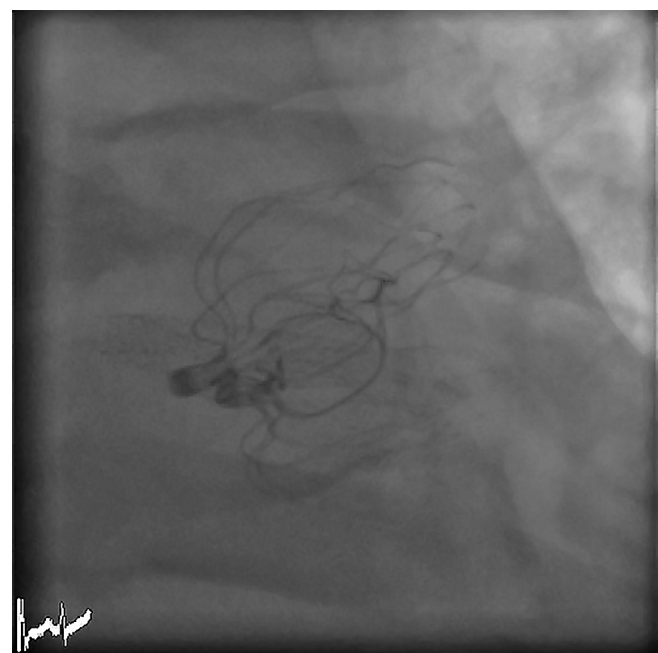
**Figure 4.** TEE 2D image at 44 degrees showing two WATCHMAN devices implanted side by side.



**Figure 5.** Cine image showing two WATCHMAN devices (Kissing WATCHMAN).



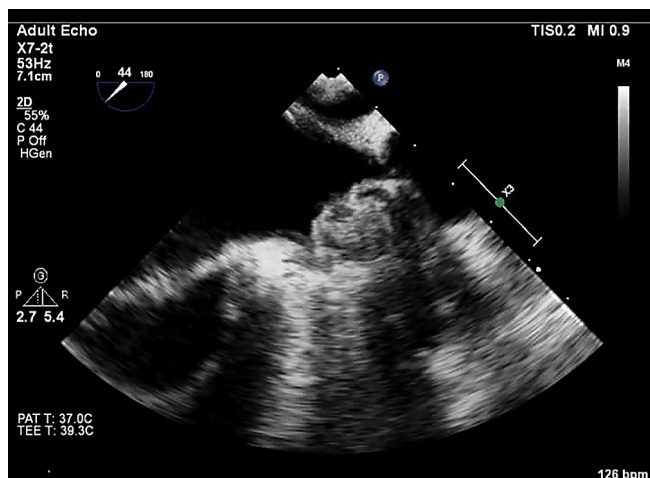
**Video 4.** Cine clip showing release of second WATCHMAN device. View supplemental video at <https://doi.org/10.12945/j.jshd.2019.010.18.sup.04>.



**Video 5.** Cine clip showing two WATCHMAN devices (Kissing WATCHMAN). View supplemental video at <https://doi.org/10.12945/j.jshd.2019.010.18.sup.05>.

Since the introduction of LAA closure devices about 15 years before, multiple types and shapes of devices have been introduced and tested, but the ACP and Watchman system are the most widely used. Multiple

studies, including PROTECT-AF [8], CAP Registry [9], PREVAIL [10], and ASAP studies [11], have proved the efficacy and safety of the Watchman device in different sets of patients.



**Video 6.** TEE image showing well seated two WATCHMAN devices at 44 degrees. View supplemental video at <https://doi.org/10.12945/jjshd.2019.010.18.sup.06>.

An autopsy study of the normal heart documented that 80% of the LAA have more than one lobe, with slightly more than half having 2 lobes [12]. Considering the great variability of the LAA anatomy in relation to size, shape, volume, number of lobes, and shape of the orifice, no single device is ideal to fit all [13]. The shape of the LAA ostium is elliptical in approximately 69% of cases, with a maximum depth ranging up to 51 mm, while the rounded shape is present in only 5–6% of cases. The diameters of the ostium show minimal changes during the cardiac cycle (1–2 mm) and no change during AF [14]. Consequently, implanting a round device into an oval-shaped ostium may lead to incomplete occlusion and peri-device leakage. This problem is reported in 32% of the cases after Watchman implantation [15]. Incomplete occlusion of the LAA is thought to result in a higher event rate, but 2 analyses that used the PLAATO and Watchman systems, respectively, showed no increased event rate of thromboembolism [16]. Occasionally, if gaps are significant, then it is possible to occlude them by using different devices fully [17]. This eccentricity in the shape of the orifice also poses hurdles in estimating the exact size of the ostium by using two-dimensional (2-D) TEE and frequently results in an underestimation of the exact diameter, which leads to implantation of an undersized device.

In addition to the eccentric shape of the ostium, another problem related to the single-device clo-

sure technique is the maximum body size of the LAA. Even the new-generation ACP and Watchman devices can fit into a maximum body diameter of 30 mm [18]. Exclusion of the LAA might require 2 devices in such cases. Enio et al. reported a case series where 5 of their patients underwent double-device implantation using devices other than Watchman, with good anatomical results at follow-up [3]. Implanting 2 Watchman devices in a single patient to close bilobulated LAA was previously reported once. The report concluded that occlusion of 2 separate lobes with a common ostium is practically possible, as the main bodies of each lobe are separated by a thick ridge of pectinate muscle [19].

Although it technically sounds feasible, few challenges are associated with double-device implantation. First, the polyethylene terephthalate membranes and nitinol cage covering the Watchman device can be damaged while releasing the second device, which itself can serve as a nidus for thrombus formation due to residual leakage and difficult endothelialization. Second, putting 2 round-shaped devices over an elliptical ostium can lead to multiple residual flows between the LA and LAA. Third, no long-term data are available to support double-device implantation in the LAA; therefore, delayed mechanical complications are unknown.

This case shows that sealing of a bilobed LAA is technically feasible especially with a favorable anatomy, which includes totally separated bodies of both lobes with adequate body sizes. Although this procedure can potentially result in damaging the delicate membranous part of the Watchman device, for the time being, no data are available to evaluate the long-term effects of this interaction. We also suggest that 2-D TEE alone can underestimate the size and anatomy of the LAA. Preprocedural assessment using three-dimensional TEE and intraprocedural angiography is crucial for better occlusion of the LAA.

### Conflict of Interest

The authors have no conflict of interest relevant to this publication.

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